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Exploring Digital Technology Use in Socially and Technologically Complex Contexts: The Case of Discord

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Declaration

I confirm that this thesis presented in fulfilment of the requirement for the degree of PhD in Management has:

1) been composed entirely by myself
2) been solely the result of my own work
3) not been submitted for any other degree or professional qualification

I confirm that in this thesis's writing and editing process, I have utilised AI tools, including ChatGPT and Google Bard (now Gemini), to proofread the writing of some sentences. The use of thesis tools was exclusively to identify potential grammatical errors and improve the structure of sentences to enhance their coherence and clarity. Using AI tools does not involve searching for factual information or directly copying and pasting responses. Some examples of the prompts used are:

- What are the synonyms of [word]?
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- Can you rephrase [the sentence] in a more coherent way?
- Which sentence is grammatically correct [sentence 1] or [sentence 2]?

This thesis's content, arguments and writings are my original work.

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Abstract

Technology use is a central phenomenon in information systems literature and it has long been investigated by employing a wide range of theoretical lenses. Such research on technology use has shown the importance of the context in explaining technology use. However, in recent years, the advent of a new generation of technologies — digital technologies —has increased the complexity of the context in which technology use occurs. This complexity has been argued to alter the patterns of technology use. As a result, a number of information systems researchers have argued that new theories are required to adequately account for the use of such new forms of digital technologies.

This thesis explores the use of digital technology in complex contexts. The characteristics of digital technologies, such as openness and generativity, have augmented the complexity of the context in which technology use occurs, justifying the focus on examining the role of contextual complexity in understanding technology use. This thesis considers two aspects of such complexity: social and technological. Social complexity arises from the multiplicity of users involved in the use of a particular technology driven by diverse goals, values, norms and expectations. Technological complexity arises from the multiplicity of technologies that users encounter to attain a particular goal. Thus, this thesis comprises two research questions:

RQ 1: How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?

RQ2: How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals?

To answer these research questions, the thesis employs an interpretive case study research design involving a communication and social media platform called Discord. The research design is split into two distinct but related empirical studies: the first

study addressing the first research question relies on 20 interviews with different categories of Discord users; the second study relies on 21 interviews with a select category of Discord users – Discord bot developers – to address the second research question.

The first empirical study integrates the technology affordances lens to examine technology use with the institutional logics perspective to examine social complexity. The findings from the first empirical study suggest that the configurations of multiple institutional logics, rather than the presence (or absence) of individual logics, are key explanatory factors for understanding how complexity in social contexts shapes the users' patterns of technology use. The second empirical study utilises the technology affordances lens to examine the different affordances provided by multiple technologies. The findings from the second empirical study indicate that users evaluate the affordances of multiple technologies based on three propensity dimensions (relative effectiveness, normativity and recognition), which explains how users leverage multiple technologies substitutionally or complementarily. The findings from this study point to three contextual factors that influence the affordance propensity dimensions: relevant social groups; the capabilities of the platform; and task characteristics.

The thesis contributes to existing literature by integrating the findings of the two empirical studies to develop a framework that offers a deeper understanding of technology use by considering the complexity of social and technological contexts. This framework contributes to existing technology use literature by explaining the relationship between logics configurations and technology affordances. The thesis also contributes to the affordance lens literature by introducing the affordance propensity concept, which is useful for explaining the patterns of multiple technologies use.

Lay summary

Digital technologies, such as social media, digital platforms, artificial intelligence and the internet of things, are becoming deeply integrated into our everyday activities. A wide range of Individuals use such technologies differently for work, leisure, education and finance as they are driven by different goals, norms, expectations and assumptions. For example, individuals use LinkedIn for professional networking, Reddit to engage in online communities, Zoom for online learning and Blockchain to send payments. At the same time, the availability of multiple technologies that serve similar purposes has dramatically increased. As such, individuals can choose between WhatsApp to chat with friends, Teams to communicate with colleagues and Facebook Messenger to keep in contact with acquaintances.

This thesis seeks to understand how individuals use technologies in such complex environments. To do so, the thesis looks at Discord, which is a communication and social media platform used by individuals for different purposes. The findings indicate that when users are exposed to diverse goals, norms, expectations and assumptions, their use of Discord is more innovative. For instance, individuals are more likely to develop Discord bots to meet their specific needs when they operate in multiple Discord communities. The findings also show that when users encounter multiple technologies that serve their goals, they evaluate such technologies based on their alignment with users' goals, values and norms, and cognitive mental models.

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Acronyms

AI	Artificial Intelligence
ANT	Actor-Network Theory
API	Application Programming Interface
EHR	Electronic Health Records
ERP	Enterprise Resource Planning
HCI	Human-Computer Interaction
ICT	Information and communication technologies
IL	Institutional Logic
IS	Information Systems
IT	Information Technology
NHS	National Health Service
SDK	Software Development Kit
SMS	Short Messaging Service
TA	Technology affordance
TAM	Technology Acceptance Model
TTF	Task-Technology Fit
UTAUT	Unified Theory of Acceptance and Use of Technology

1 Chapter 1: Introduction

1.1 Overview

Digital technologies are entrenched in our contemporary everyday activities and experiences. People are increasingly using a wider range of technologies for work, leisure, education, finance and health. Social networks such as Facebook and LinkedIn are used to socialise and conduct professional networking; communication platforms such as WhatsApp, Slack and Microsoft Teams are used to exchange information with other people to coordinate personal life and work activities; blockchain technologies are used for investment and accessing government services online; while online communities such as Reddit and Discord are used to engage with like-minded people and support professional skill development. The availability of such a multitude of different technologies has significantly increased the complexity of the technological landscape in which people work and interact.

At the same time, the pervasiveness of these technologies has blurred the boundaries between the use of technology in personal and professional life (Scheepers & Middleton, 2013). As a result, technologies are no longer exclusively used for either personal or professional purposes. For instance, people use WhatsApp for personal communication with friends and family; but they also use it to discuss work-related tasks with co-workers. Likewise, people use cloud services such as Google Drive to store personal files as well as to support professional collaborative work. The multiplicity of users' goals in leveraging the same technologies leads to their use in different ways in different contexts, increasing the complexity of the social context in which the interaction between users and technology takes place. This increased complexity due to the multiplicity of technologies available to users and the multiplicity of users' goals may alter the way they interact with the technology, which justifies the focus of this research to explore technology use in complex contexts.

Technology use is a core construct in information systems (IS) research. There is extensive research into technology use, which primarily employs quantitative methodologies. This stream of research is interested in understanding the antecedents of technology use, such as attitudes, intentions, perceived usefulness and ease of use (Venkatesh et al., 2003; Davis, 1989), as well as the impacts of technology use on performance (Goodhue & Thompson, 1995), productivity and satisfaction (DeLone & McLean, 2003). This stream of quantitative research conceptualises technology use through a proxy, where such proxies generally involve simple measures standing in for technology use (Burton-Jones & Straub, 2006), such as frequency of use (the number of times the technology is used), duration of use (the amount of time spent using the technology), breadth of use (the number of features and functionalities used), and degree of dependency on technology to complete tasks (Burton-Jones & Straub, 2006; Hassan et al., 2017; DeLone & McLean, 2003; Sun & Zhang, 2005). This stream of technology use research is primarily interested in people's attitudes and intentions toward technologies. Such research has been extremely useful in expanding our understanding of why people adopt technologies, but it does not reveal much about how people actually use these technologies (Barki et al., 2007).

In seeking to understand how people actually use technology, research has tended to employ a qualitative interpretive research design that involves engaging directly with users as this research design is best suited to investigating how people actually interact with technologies in their everyday activities (Orlikowski & Baroudi, 1991). For instance, studies have examined how technology is used in practice in organisations (*technologies-in-practice*; Orlikowski, 2000), how the same technology can be interpreted and used differently by various organisational actors (*technological frames*; Orlikowski & Gash, 1994), and how organisational actors use technologies to achieve organisational goals (*technology affordances*; Leonardi, 2011, 2013b). This stream of interpretive research on technology use focuses on the relational interaction between users and technologies in a particular context, which

provides a better explanation of how users utilise technologies in the way they do. The interpretive research on technology use has shown the significance of the context and argued that researchers cannot fully understand technology use without considering the context in which technology use occurs (Orlikowski & Barley, 2001; Russell & Williams, 2002; Leonardi & Barley, 2008). This focus on incorporating the context in the analysis of technology use is particularly warranted when technology is viewed as "an evolving system embedded in a complex and dynamic social context" (Orlikowski & Iacono, 2001, p. 126).

1.2 Research Problem

The interpretive approach to studying technology use provides a deeper understanding of how people use technologies in a particular context. Such research has offered insights into the use of technologies in socially complex contexts. For example, institutional research highlights the importance of the complexity of the social context in explaining the patterns of technology use. However, this research focuses on examining the use of "traditional" information technologies (IT) such as enterprise information systems (Berente & Yoo, 2012), electronic health records (Currie & Guah, 2007; Baroody & Hansen, 2012) and telemedicine (Oborn et al., 2021) in complex organisational settings characterised by diverse norms, values and expectations. This research also looks at the use of a single technology, overlooking the fact that users have a collection of technologies at their disposal where they rely on multiple technologies to achieve their goals.

In the last decade, the context in which technology is used has changed. With the advent of digital technologies, the context of technology use has become increasingly complex along two dimensions: social and technological. Digital technologies such as social media, digital platforms, blockchain and artificial intelligence have recently emerged as a new generation of information technologies that permeate our everyday activities (Nambisan et al., 2019; Bailey et al., 2022). These digital technologies have unique characteristics that set them apart from previous

generations (Yoo et al., 2010). These characteristics, such as openness and generativity (Nambisan et al., 2019), have augmented the complexity of the context in which technology use occurs.

Previous studies examining technology use have shown that the patterns of technology use are shaped by the social context in which it occurs. This social context helps explain the different ways people interact with technologies (e.g., Orlikowski & Iacono, 2001; Baily et al., 2022; Leonardi & Barley, 2008). This view aligns with conceptualising technology users as social actors interacting and operating in multiple social contexts (Lamb & Kling, 2003). These multiple social contexts embody their own norms, expectations and practices that shape the use of technology (Fulk et al., 1990). Depicting users as social actors implies that technology users utilise the technology in specific ways that are aligned with the established norms, expectations and practices of a particular social context. The openness of digital technologies heightens the complexity of this social context in which technology use occurs. Openness refers to the involvement of diverse users operating in multiple social contexts in the use of technology (Schlagwein et al., 2017; Nambisan et al., 2019). This wide involvement of users as social actors in the use of digital technologies means that technology use is influenced by a wide range of goals, norms, expectations and practices that characterise the different social contexts that users attend to when engaging with the technology. This increase in the range of goals, expectations and norms reflects the heightened complexity of the social context that characterises the use of digital technologies.

The wide range of technologies characterising the digital technological landscape in which users operate also shapes how they use technology. Studies have shown that in pursuing their goals, users encounter numerous technologies that they leverage to carry out their tasks and achieve their goals (Carroll & Reich, 2017; Lee et al., 2007b; Baskerville, 2011). The multiplicity of technological options suggests that users face challenges in selecting and using technologies that often offer similar features and functionalities because they are required to evaluate each technology's capabilities,

limitations and compatibilities in relation to their goals. The generativity of digital technologies heightens the complexity of the technological landscape in which technology use occurs. Generativity refers to the technology's capacity to produce new applications and innovations, implying that digital technologies are dynamic and often overlap in their features and functionalities (Yoo et al., 2012). The result of this overlap is a convergence of the features of multiple technologies that can serve users' goals. For instance, users wishing to communicate with other people encounter a wide range of communication technologies (e.g., WhatsApp, Telegram, Signal and iMessage), which are both easily and freely available to them and serve their goals. Consequently, the generativity of digital technologies results in increased integrations and interoperability[1] between multiple technologies due to their dynamic nature. This increased integrability and interoperability illustrates that users encounter a multitude of technologies that are increasingly becoming interconnected and overlapping, putting pressure on users to assess which technology is best suited to achieving their goals. This multitude of technologies amplifies the complexity of the technological context that affects how people select and use technologies to perform their tasks and achieve their goals.

These unique characteristics of digital technologies (openness and generativity) have begun challenging existing theoretical assumptions, leading IS research to call for new theories that take these characteristics into consideration when examining technology use (Yoo, 2010; Bailey et al., 2022; Nambisan et al., 2019). Existing studies looking at the social context of technology use tend to focus on examining technology use in one social context in isolation. For example, studies employing institutional or cultural theories to examine technology use (Mignerat & Rivard, 2009; Leidner & Kayworth, 2006) do so by examining technology use within a particular institutional or organisational culture with little attention given to the relationship between multiple social contexts and their influence on the patterns of technology use.

[1] "Interoperability" refers to the ability of two or more technologies to exchange information and work together (Hodapp & Hanelt, 2022).

Similarly, studies on technology use tend to focus on single technology use (Carroll, 2008). While several studies have shifted the focus from this singular view of technology use to exploring how users utilise multiple technologies (Carroll & Reich, 2017; Lee et al., 2007b; Watson-Manheim & Bélanger, 2007), these studies assume that users leverage multiple technologies in such a way whereby each serves a particular goal, overlooking the interrelationship between multiple technologies and how they can be used together to achieve goals. Failing to acknowledge this increased complexity of the context diminishes the ability of information system researchers to fully comprehend the process by which technology users engage with technology in different ways and how they encounter and assess alternative actions arising from the contextual pressures associated with increased social and technological complexity. These alternative actions may, in turn, explain technology users' interactions with the technology.

1.3 Research Aim and Approach

This thesis examines the individual use of digital technologies for personal and professional purposes outside organisational context. In particular, the thesis focuses on digital platforms that individuals use in their everyday activities such as social media platforms (Discord, Facebook, X and Snapchat), communication platforms (Slack, WhatsApp and Teams) and collaboration platforms (GitHub and Stack Overflow). Unlike traditional organisation IT, digital technologies are widely used both inside and outside organisational boundaries. For example, Treem et al. (2015) show how users' perceptions and experience with social media outside organisational contexts inform their use of these technologies within organisational settings. This means that understanding how individuals use digital platforms outside organisational context is also relevant to inform research on technology use within organisations.

Building on the above discussion of the technology use literature and given the implications of the characteristics of digital technologies on the complexity of the

context, the main aim of this thesis is to understand digital technology use in complex contexts. To achieve this aim, two empirical studies are conducted to answer two research questions and unpack two aspects of context complexity, social and technological, and their influence on the patterns of technology use. The two research questions are:

1. How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?
2. How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals?

The first empirical study explores the influences of social complexity on technology use (Chapter 4). The study examines how different users operating in multiple social contexts draw on diverse goals, interests, norms and practices when interacting with the technology. By incorporating the diversity of the social context into the study of technology use, this research provides a nuanced understanding of how users engage with technology and how the patterns of use vary across different social contexts.

The second empirical study examines the impact of the complexity of technological context on the patterns of multiple technology use (Chapter 5). The study explores how and when users leverage multiple platforms to achieve their goals. The study also unveils the criteria users apply when selecting and using a particular platform over another. This study avoids examining platform use in isolation, instead considers other platforms available to users. This approach provides a deeper understanding of the technological landscape and how multiple platforms are used together to achieve users' goals.

This thesis adopts an interpretive case study research design and draws from a communication and social media platform called Discord as the empirical setting for the two studies. Discord was chosen because it represents a unique case where users' interactions and socialisation are embedded in multiple social contexts. Diverse

Discord users come together and form online communities around shared interests. As users interact and socialise within these online communities, they form social structures that embed specific cultural norms, conventions, rules and customs that shape how they behave (Faraj et al., 2016). Discord is also often used in combination with other platforms such as WhatsApp, Facebook, GitHub, YouTube, etc. Therefore, Discord provides an appropriate empirical setting for exploring the influence of social complexity (a wide range of users drawing on diverse goals, norms and practices), as well as technological complexity (the multiplicity of technologies) on the patterns of technology use.

1.4 Research Contributions

This thesis offers significant contributions to both research and practice. The first empirical study of the thesis advances research on digital technology use by explaining the relationship between multiple social contexts and their impact on the patterns of technology use. This research develops a novel approach for combining the technology affordances and institutional logics lenses to examine technology use. Existing research that combined technology affordances and institutional logics has typically examined technology use in multiple social contexts separately, without considering how different social contexts and their interaction impact the patterns of technology. This new approach offers an alternative way to examine technology use in social complex contexts. It examines the relationship between multiple values, norms and assumptions across various social contexts (institutional logics) and their roles in shaping technology use. The second empirical study of the thesis contributes to the technology affordance lens by developing the affordances propensity concept. Affordance propensity refers to the likelihood of leveraging technology affordance to perform a task. Extant research on technology use often examine the use of a single technology in isolation, ignoring that users tend to rely on multiple technologies to achieve their goals. The affordance propensity concept clarifies the criteria that users evaluate and use multiple technologies in a complex landscape with many available technological options, thus explaining the patterns of multiple technology use. The

thesis also offers a more granular understanding of digital technology use by leveraging the findings of the first and second empirical studies to develop an integrated framework of technology use. This framework provides researchers with a toolkit to investigate digital technology use in socially and technologically complex contexts.

This thesis also contributes to the practice by enabling technology developers to understand the context in which their technologies are used, which helps them improve their users' experience. This research also provides valuable insights for technology developers by highlighting the criteria users employ when evaluating and choosing among technological options. Understanding these criteria will enable developers to design and refine their technologies more effectively, ensuring they align with user preferences and needs

1.5 Thesis structure

The thesis is composed of seven chapters and two appendices. The structure of the thesis is outlined in Figure 1.1.

The introduction chapter provides an overview of the technology use research by presenting the common ground and describing the recent changes in the complexity of the context due to the characteristics of digital technologies. It then outlines the research aim and the approach applied to achieve this aim.

The second chapter reviews the existing literature on technology use. This chapter reviews the different theories that conceptualise the relationship between users and technologies at different levels of analysis (section 2.2.5), entailing a discussion of each theory's aim, application, and key strengths and weaknesses. The theoretical framework underpinning this thesis is outlined in section 2.3. This section presents technology affordances (section 2.3.1) as the overarching theoretical lens because it captures both the technology use, by linking users' goals with technology features, and the technological complexity, by accounting for the features of multiple

technologies. This section also introduces the institutional perspective (section 2.3.2) that is utilised to complement the technology affordance lens in the first empirical study; this theory has the capacity to capture the social complexity by proposing that technology users are embedded in multiple contexts and draw from different institutional logics.

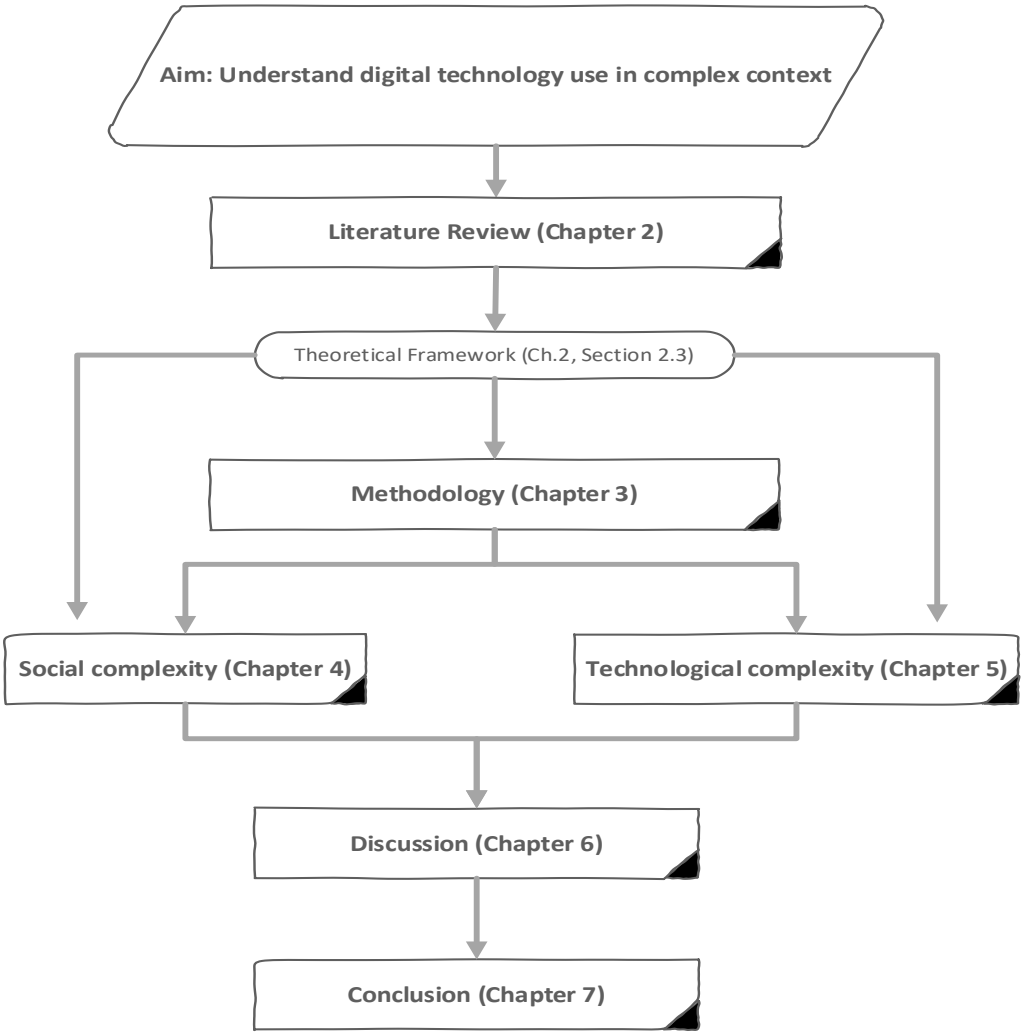


Figure 1.1. Structure of the thesis

The third chapter describes the research methodology. This chapter delineates the research approach and design (section 3.2) and explains why the interpretive research design was chosen (as the research focuses on understanding the

phenomenon (technology use) from the participant's perspective). The chapter describes the empirical setting of the thesis (Discord) in section 3.3 and presents this as a unique and revealing case study that answers the research questions. Details of the data collection techniques are provided in section 3.4, in which in-depth interviews are the primary source of data in this research. The chapter also explains how participants were selected and interviewed. Section 3.5 elaborates on the abductive approach to data analysis by drawing on theory to construct a provisional list of codes while allowing for new codes to emerge from the data. The chapter ends with a discussion of the ethical procedure followed to ensure the integrity of this research (section 3.6).

The findings of the first and second empirical studies are presented in Chapters Four and Five respectively. Chapter Four examines the social complexity and its influence on technology use by exploring the relationship between Discord affordances and institutional logics. This chapter commences by identifying the Discord affordances that participants leverage (section 4.2), and it then identifies the institutional logics drawn from the interview data (section 4.3). The final section (4.4) explores the relationship between Discord affordances and institutional logics, following the data analysis steps and examining the relationship between Discord affordances and individual institutional logics (section 4.4.1), Discord affordances and multiple institutional logics (4.4.2), and Discord affordances and the configurations of institutional logics (4.4.3).

Chapter Five examines the technological complexity and its influence on technology use by exploring the use of multiple technologies. The chapter identifies the two approaches participants use when leveraging multiple technologies: substitutional and complementary (section 5.2). The concept of affordance propensity is introduced (section 5.3) as a construct to explain the two types of multiple technologies use. This section highlights the affordance propensity dimensions that participants used to evaluate the affordances of multiple technologies. The chapter concludes by

identifying three contextual factors found to influence the affordance propensity dimensions (section 5.4).

The discussion of the findings of the two empirical studies is presented in Chapter Six. This chapter comprises three sections. The first summarises the findings of the first empirical study and explains them by drawing on findings in the existing literature (section 6.2.1), as well as articulating the contributions of the findings to existing literature (section 6.2.2). The second section in turn summarises the findings of the second empirical study, links the findings to existing research (section 6.3.1) and outlines the contributions of the findings to existing research (section 6.3.2). The last section of Chapter Six presents the integrated framework, which combines the findings of the first and second empirical studies (section 6.4) and explains its contribution in terms of providing a richer understanding of technology use by taking the complexity of the social and technological contexts into account.

Chapter Seven concludes the thesis by providing a brief outline of the research questions, the key findings and the theoretical and practical contributions of these findings (section 7.1). This chapter also includes a discussion of the limitations of this work (section 7.2) and identifies a number of recommendations for further research (section 7.3).

Two appendices are included in this thesis. The first (Appendix 1) provides a copy of participant information sheets and consent forms used during data collection. The second (Appendix 2) presents the findings of the analysis of the relationship between Discord affordances and the combination of institutional logics.

2 Chapter 2: Literature Review

2.1 Introduction

This chapter critically examines the existing literature on technology use to establish the grounding for the phenomenon this thesis seeks to explore, that is, understanding digital technology use in complex contexts. Existing research shows that context plays a significant role in shaping technology use (Leonardi, 2013a; Russel & Williams, 2002; Orlikowski & Barley, 2001; DeSanctis & Poole, 1994). The focus of this thesis is on examining the role that the complexity of such contexts plays in shaping how users leverage digital platforms. Complexity is defined slightly differently in different disciplines. According to the Cambridge Dictionary,[2] complexity refers to a state of having many parts and being difficult to understand. In systems studies, a complex system refers to a system comprising many interacting components (Simon, 1962). Organisational studies research uses complexity to describe organisations and their environment, which are characterised by multiple levels of elements (Anderson, 1999). In organisations, complexity is used to describe the number of hierarchal levels of the organisational structure and the number of departments within the organisation. Regarding the organisational environment, complexity is used to describe "the number of different items or elements that must be dealt with simultaneously by the organisation" (Anderson, 1999, p. 216). In general, a particular context is said to be complex when it has multiple interconnected parts, making it difficult to understand, study and analyse (Akaka et al., 2013). Thus, in this thesis, complexity is defined as the multiplicity of multiple interacting elements.

This thesis focuses on two aspects of complexity related to the context of technology use: social and technological complexity. Drawing on institutional theory, specifically institutional complexity literature (Greenwood et al., 2011; Raynard, 2016), "social

[2] "Complexity" (2023) *Cambridge Dictionary*. Available at: https://dictionary.cambridge.org/dictionary/english/complexity (Accessed 19.11.2023).

complexity" is used in this research to denote the presence of multiple values, norms, beliefs, expectations and practices that inform the actions of social actors. This multiplicity generates pressure on technology users as to which values, norms, beliefs and practices to adhere to (Vermeulen et al., 2016). Following Carroll and Reich's (2017) observation that technology users operate in a complex world characterised by many technological options, "technological complexity" is used in this research to refer to the multiplicity of technologies available to users to pursue their goals.

This chapter is divided into two main sections: the first section reviews the existing literature on technology use, while the second develops the theoretical framework that informs the research. The literature review section unpacks the various definitions of technology in the literature and clarifies the type of technology that the thesis investigates. Then, it defines technology use and critically reviews relevant theories that are drawn on to conceptualise technology use. The last part of the literature review section introduces digital technologies, delineating their unique characteristics and reviewing the applicability of existing theories on technology use in light of digital technology characteristics. The second section of this chapter introduces technology affordances and institutional logics lenses as the theoretical framework to examine technology use in socially and technologically complex contexts. This second section comprises three parts: part one reviews the technology affordances lens and discusses its application to examining technology use and its potential to address technological complexity; part two introduces the institutional logic lens and discusses its potential to address social complexity; part three reviews the literature that combines technology affordances with institutional logics and highlights important gaps in such literature, which will be addressed in this research.

2.2 Conceptualising Technology and Technology Use

Technology use is a major area of interest in IS research that has received significant attention (Burton-Jones & Straub, 2006). As the key focus of this research is on understanding how users utilise technology, it is important to begin by defining what

the term “technology” means, what type of technologies this research investigates, and how existing literature conceptualises technology use.

2.2.1 What does “technology” mean?

To clearly understand the phenomenon that this research addresses, it is crucial to define the term “technology”. Previous research has acknowledged the difficulty of precisely defining this term (Salomon, 1984; Fleck & Howells, 2001). This difficulty emerges from the abstract and dynamic nature of technology, meaning different things to different people (Salomon, 1984). This has resulted in definitions proliferating in different disciplines and contexts (Fleck & Howells, 2001). Some authors have referred to technology as tools, equipment and artefacts made by people. For example, Rip and Kemp (1998, p. 329) define technology as the “strategic employment of inventions”, while Kline (1985, p. 4) defines technology as artefacts made by humans that do not exist in nature. Other authors define technology as the techniques, knowledge, know-how or information needed to design and produce products (Reddy & Zhao, 1990; Salomon, 1984; Fleck & Howells, 2001). Seeking to encompass these multiple dimensions, Schon defines technology as “any tool or technique, any product or process, any physical equipment or method of doing or making, by which human capability is extended” (Schon, 1967, p. 1). In this work, I follow Kline’s (1985) definition of technology as an artefact made by humans, as this definition highlights the role of the human actor: technology is a human-made object.

This research focuses on a specific category of technology, i.e., human-made software applications and investigates one specific type of such applications: digital platforms that individuals use on personal devices, such as computers and mobile phones, to engage in their everyday activities. Digital platforms are defined as multi-sided network that facilitate interactions between distinct but interdependent groups of users (Koh and Fichman, 2014). Examples of digital platforms examined in this thesis include social media platforms such as Facebook, Instagram, X (formerly Twitter), and Snapchat; communication platforms such as Discord, WhatsApp,

Telegram, Teams, and iMessage; and collaborative and knowledge-sharing platforms like GitHub and Stack Overflow. Throughout the thesis, the term “technology” and “digital platforms” are used interchangeably to refer to social media, communication and collaborative platforms.

2.2.2 Technology use

This research adopts Burton-Jones and Gallivan's (2007) definition of technology use, which refers to users’ utilisation of technology features to complete a particular task. Technology use is conceptualised variously in the literature based on diverse measures, including the frequency of using the technology and number of accesses (DeLone & McLean, 2003), technology features leveraged and duration of use (number of hours) (Burton-Jones & Straub, 2006), variety of uses (Zhu & Kraemer, 2005), and type of use (sending emails, watching videos) (Blank & Groselj, 2016). However, these conceptualisations have been criticised for lacking the necessary analytical depth to explore how technology is used and falling short of capturing the relationship between technology use and the completion of tasks (Barki et al., 2007).

A more elaborate view of technology use is the relational view between technologies and users that was developed in the human-computer interaction (HCI) domain (Harwood & Eaves, 2020; Kaptelinin & Nardi, 2012). This view accounts for the social and material aspects of technology use, where users and their goals represent the social aspect, while technology features and functionalities represent the material (technical) aspect. Burton-Jones and Straub (2006) corroborate this relational view by proposing that technology use involves both users (humans) employing the technology to complete a task (the social aspect) and technology features that users leverage to carry out their task (the material aspect). This view implies that technology use results from the interaction between users and technology features. Therefore, we cannot examine a single aspect and ignore another; rather, we must attend to all aspects to examine the technology use that emerges from the

continuous interactions between users and technologies (Gregor, 2006: Orlikowski & Scott, 2008).

Suchman (1987) elucidated the concept of "situated actions" to highlight that human actions are deeply embedded within historical, cultural and institutional contexts; thus, human-machine interaction (technology use) is contingent on the specific context where the interaction occurs. Past research acknowledges the complexity of studying technology as its use is situated within a broad milieu of influences that shape users' behaviours and patterns of use (Lewis et al., 2003; Barley, 1986; Jones & Karsten, 2008; Orlikowski & Robey, 1991). This thesis focuses on two aspects of this complexity: (1) social complexity associated with the multiplicity of social actors characterised by multiple interests, goals, values and expectations involved in the use of technology; and (2) technological complexity associated with the multiplicity of technologies that users can leverage to perform their tasks.

2.2.3 Multiple social actors

Earlier streams of IS research studied "IT impact", examining the influences of technology on organisational structure, performance and satisfaction (Robey et al., 2013). IS researchers have since shifted toward an opposing stream of research that emphasises social constructivism, which looks at technology from a social perspective to explain the complex social relationship associated with technology development and use (Leonardi & Barley, 2008; Robey et al., 2013). Studies that look at the social shaping of technology (Williams & Edge, 1996), the social construction of technology (Pinch, 2012) and sociomateriality (Orlikowski, 2007) highlight the multiple actors, factors and contexts that shape and are shaped by technology.

This shift toward social constructivist research to examine technology puts greater emphasis on users and how they interpret and give meaning to the technology, which leads to diverse patterns of technology use (Orlikowski & Gash, 1994). Users play a crucial role in interpreting and creating the meanings and value of technology according to their specific needs, which are shaped by the social context in which

they operate (McLaughlin, 1999). As noted by Robey et al. (2013), technology users operate in technical and social contexts that shape their actions. Therefore, users are not isolated individuals operating in a vacuum; rather, they are entangled in wider contexts that shape their interaction with the technology (Pollock & Hyysalo, 2014).

The emphasis on the technology user has led researchers to re-examine the idea of the user itself (Lamb & Kling, 2003; Pollock & Hyysalo, 2014; Baskerville & Myers, 2023). Lamb and Kling (2003) develop an early conceptualisation of technology users, viewing them as "social actors" occupying various social roles and operating in multiple social contexts. The key assumption of this conceptualisation is that social actors and their actions (i.e., their use of technology) are socially embedded and constrained by a multiplicity of social contexts, which is a useful way to account for users and their contexts in understanding their patterns of use. Pollock and Hyysalo (2014) later add the concept of "reference actor" as a subtype of the social actor, referring to the network of technology users who form a technology community who not only use the technology but are also involved in the process of marketing and selling it. Baskerville and Myers (2023) propose the most recent conceptualisation, building on previous conceptualisations, to refer to the "people" who use the technology for personal and professional purposes and have multiple roles in relation to it (e.g., buyer and seller on eBay). This research adopts the first conceptualisation of users as social actors as this captures the complex and multiple roles of users in relation to the technology (Lamb & Kling, 2003).

Depicting technology users as social actors operating in various social contexts suggests that they draw on multiple norms, rituals and expectations of how the technology should be used in a particular context (Baskerville & Myers, 2023). Social actors are influenced to use technology in different ways because they operate in multiple social contexts that define the appropriate or legitimate way to use the technology based on the norms, rituals and expectations of the social context. Therefore, social complexity arises from the multiplicity of norms, rituals, expectations and practices that are institutionalised and relevant to the multiple

social contexts that users are embedded within. Understanding technology use thus becomes a difficult endeavour due to the multiplicity of cultural norms, rituals, values and expectations as users engage with the technology in distinct ways in different contexts because they interpret and give meaning to the technology differently.

2.2.4 Multiple technologies use

Building on the technology use definition presented in section 2.2.2, in this research multiple technologies use is defined as the utilisation of multiple technologies' features by a single user to perform tasks within a contemporary time span. A "contemporary time span" indicates that one user has utilised multiple technologies together recently and there was no time gap between their use. Technology users leverage multiple technologies, often at the same time (Baskerville & Myers, 2023). However, most technology use literature investigates the use of a single technology in isolation from other technologies and ignores the effect of other technologies on users' choices (Woerner et al., 2004; Boczkowski & Orlikowski, 2004; Lindberg et al., 2014). This overemphasis on a single technology has resulted in a paucity of research examining the use of multiple technologies (Lee et al., 2007b; Carroll, 2007; Scheepers & Middleton, 2013). There are only a few studies investigating users' selection and use of multiple technologies; these employ terms such as "media toolbox" (Woerner et al., 2004), "media repertoires" (Watson-Manheim & Bélanger, 2007), "communication portfolio" (Lee et al., 2007b), "technology portfolio" (Carroll, 2007), "information and communication technologies (ICT) ensemble" (Scheepers & Middleton, 2013) and "information system architecture" (Baskerville, 2011) to denote the use of multiple technologies.

In their study of multiple technologies in a hybrid work configuration, Woerner et al. (2004) examine the use of media technologies such as phone, email, instant messaging and conferencing software to communicate. They use the notion of an "organisational media toolbox" to refer to the multiple technologies that a group of users can utilise. Users can draw on the media toolbox and select one or combine

technologies to communicate with colleagues. Similarly, Watson-Manheim and Bélanger (2007) focus on understanding how and when multiple media technologies are used in an organisational setting when users encounter a wide range of communication media. They adopt the term “communication media repertoire” to explain how users select a combination of media technologies in their interactions with other users. Lee et al. (2007b) in turn propose the concept of a “communication portfolio”, which refers to one or a combination of multiple communication technologies that members of an organisation use to overcome communication failure. Lee et al. (2007b) argue that users can employ technologies from the portfolio either sequentially (moving from one technology to another), concurrently (combining the use of two or more technologies) or repetitively (using the same technology more than once).

Drawing on Lee et al.’s (2007b) communication portfolio concept, Carroll (2008) and Carroll and Reich (2017) suggest “technology portfolio” as a concept to investigate the multiplicity of technologies accessed and used by individuals. Carroll (2008) states that users deal with this multiplicity of technologies by: (1) developing a personal technology portfolio that contains a mixture of multiple technologies; and (2) mixing and matching between portfolio components (i.e. technologies) to maximise the value gained from the portfolio to meet their needs. Carroll and Reich (2017) suggest that technology portfolios are purposeful, where users construct their technology portfolios to satisfy their needs; they are diverse, containing multiple technologies with different functionalities; and they are dynamic in the sense that their composition changes over time by adding new technologies, removing the ineffective ones, or complementing existing technologies with new ones. Baskerville (2011) further focuses on the individual use of technologies and uses the term “individual information system architecture” to describe the multiple devices (laptops, tablets, smartphones) and applications (email, social media, VoIP) that individuals employ in their personal and work lives.

In the same vein, Scheepers and Middleton (2013) indicate that individuals often utilise a plurality of technologies, using the term "personal ICT ensembles" to describe the collection of technologies that individuals use across multiple contexts (i.e., work and home contexts). Their research focuses on exploring the effect of the personal ICT ensemble on users' quality of life. They draw on the affordance lens to conceptualise the ICT ensemble as the set of affordances offered by multiple technologies, where individual users personalise these affordances to improve their quality of life. This personalisation implies that ICT ensembles are flexible, and individuals are constantly changing or updating the ensemble depending on the introduction of new technologies or failure and dissatisfaction with a single technology within the ensemble.

There are a few studies looking at the relationship between multiple technologies. For example, Shih and Venkatesh (2004) argue that multiple technologies can compete, where a new technology with superior performance replaces the main technology that offers similar functions; or they can be complementary, where a new technology enhances the use of the main technology. Benbunan-Fich (2019) also find in their analysis of wearable technologies (i.e., fitness wristbands) that the absence of one affordance must be compensated for with additional affordance from another technology. Benbunan-Fich (2019) highlights the lack of a numeric display on a wristband showing the calories burnt or the battery status, leading users to leverage the affordances of another technology (in their case, the web-based dashboard).

Carroll (2008) notes that the collection of available technologies provides users with choices. Therefore, it is important to understand how users evaluate choices when examining multiple technologies use. While previous studies highlight the role of human agency in the selection of multiple technologies (Scheepers & Middleton, 2013; Carroll, 2008), they do not adequately explain the criteria users follow when choosing among various options. One potential approach that can be applied to understand the criteria of judgement is Suchman's (1995) three bases for assessing the legitimacy of organisations. Suchman (1995) argues that the legitimacy of

organisation is assessed according to pragmatic assessment (the audience's self-interest), moral assessment (normative evaluation of organisational actions) and cognitive assessment (taken-for-grantedness and comprehensibility). Applying these criteria in the context of the use of multiple technologies may provide a basis for assessing the selection made among multiple technologies. For instance, whether one technology will support users to achieve their goals, how one technology fits with users' values and norms, and the degree to which a technology is popular and taken for granted.

One important observation from reviewing existing studies on multiple technology use draws our attention to the shortcomings of their approaches to examining multiple technologies. Firstly, the studies seeking to categorise multiple technologies into toolboxes, ensembles and portfolios, assume that each technology within the category (or the toolbox, ensemble, portfolio) has specific functionalities that serve particular tasks. However, in reality, multiple technologies might share similar functionalities that users can leverage to perform the same task. For example, users have several technological options when they wish to call someone, including WhatsApp, Instagram, Skype, Teams and phone calls, which all serve the same purpose and allow them to perform their "calling" task.

Secondly, studies indicate that users pick and choose between multiple technologies within the category according to the task at hand. Nevertheless, when multiple technologies offer similar functionalities, the process of selecting and using one becomes more complex as users engage in evaluative processes to decide which to use. For instance, WhatsApp, Instagram and Skype all offer a video calling feature and users may compare and evaluate these technologies based on the ease of using the video calling feature, the quality of the video calls in each technology, the appropriateness of using each technology in a specific use context, and the security and privacy of video calls in each technology. Therefore, such studies do not analyse the use of multiple technologies relative to each other.

Finally, the main focus of these studies is on identifying the components of each technology portfolio and explaining how these are added, removed or replaced. Thus, they do not explain the patterns of multiple technologies use or when multiple technologies are used together.

2.2.5 Theories for conceptualising technology use

Several theories at different levels of analysis (individual/group, organisational and societal) have been applied to examine technology use (i.e., the relationship between users and technologies), paying varying degrees of attention to the social and technological context in which this use occurs. At the individual/group level, there are theories such as the *technology acceptance model* (Davis et al., 1989*), unified theory of acceptance and use of technology* (Venkatesh et al., 2003), *task-technology fit* (Goodhue & Thompson, 1995), *actor-network theory* (Latour, 2005), *practice theory* (Reckwitz, 2002), *technological frames* (Orlikowski & Gash, 1994), and *technology affordances* (Markus & Silver, 2008; Strong et al., 2014) that explain how users interact with technology. At the field or societal level, *structuration theory* (Giddens, 1986; DeSanctis & Poole, 1994), *culture theory* (Leidner & Kayworth, 2006), and *institutional logics* (Friedland & Alford, 1991; Thornton & Ocasio, 2008) are the most common theories applied to examine the use of technologies within sectors, industries or broader institutional fields. The following sections will discuss these theories in terms of their aims, conceptualising the relationship between users and technologies, and key strengths and weaknesses.

2.2.5.1 Individual/group level theories

The *technology acceptance model* (TAM) is one of the most widely employed theories for examining technology use at the individual level. TAM seeks to predict users' acceptance and use of technologies (Davis et al., 1989). Drawing on the theory of reasoned action (Fishbein & Ajzen, 1975), TAM focuses on behavioural intentions as the main determinant of users' actions, i.e., the intention to use the technology. TAM postulates that users' behavioural intentions in relation to technology – and thus the

actual technology use – are determined by their attitudes towards the technology, as well as the perceived usefulness and ease of use (Legris et al., 2003). TAM has been applied to examine the acceptance of a wide range of technologies, such as word processing programs (Davis et al., 1989), email (Davis, 1993), telemedicine (Hu et al., 1999), personal computing (Igbaria et al., 1997), mobile phones (Fang et al., 2005), and healthcare information systems (Pai & Huang, 2011). One key benefit of TAM is its focus on individuals' cognition to explain technology use (Davis et al., 1989). However, its main limitation is that it focuses on predicting whether technology is used, rather than explaining how this use happens, which limits its practicality for understanding patterns of use and how different people engage with the technology in practice (Brown et al., 2010). A second shortcoming is that TAM ignores the broader context influence on shaping users' intentions to use the technology.

The focus of *unified theory of acceptance and use of technology* (UTAUT) is on understanding the factors that determine whether users accept and use technologies. Similar to TAM, and sharing the same theoretical underpinnings, UTAUT accounts for users' intentions as a way to investigate technology use. UTAUT was built on previous models such as TAM and it even draws more broadly from the theories of reasoned action and planned behaviour (Venkatesh et al., 2003). UTAUT incorporates seven predictors of technology use: performance expectancy (the perceived usefulness of the technology to users), effort expectancy (perceived ease of use), social influence (user perception that other users think they should use the technology), facilitating conditions (the appropriate infrastructure that supports the use of the technology), hedonic motivation (enjoyment and pleasure derived from using the technology), price (the cost of the technology), and experience and habit, which are moderated by three factors: age, gender and experience (Venkatesh et al., 2012). Blut et al. (2022) recently added three predictors to the model, including technology compatibility (with users' lifestyles), user education and personal innovativeness; they also added the national culture and the type of technology as moderators for behavioural intention and use. UTAUT has been extensively applied

to examine the acceptance and use of various technologies, including social media (Curtis et al., 2010), tablet PCs (Anderson et al., 2006), mobile wallets (Shin, 2009), mobile devices for e-learning (Wang et al., 2009), mobile banking (Zhou et al., 2010), home healthcare robots (Alaiad et al., 2013), and wearable technology in healthcare (Gao et al., 2015). The major strength of UTAUT is its suitability for studying the acceptance of any kind of technology in a wide range of organisational and consumer contexts (i.e. individual uses within and outside organisational settings) (Venkatesh et al., 2012). UTAUT also shares the same limitation as TAM in terms of its emphasis on the antecedent to use, which predicts use rather than explaining patterns of technology use and does not consider the broader context (Williams et al., 2015). UTATUT and TAM are also based on quantitative methods to study technology acceptance and use. Therefore, they may not be appropriate models in an interpretive research design that focuses on investigating how people interact with technologies.

Task-technology fit (TTF) seeks to explain the impacts of technology on individual performance. TTF conceptualises the relationship between users and technologies by examining how well the technology fits with the task that users intend to perform (Goodhue & Thompson, 1995). The core assertion of TTF is that for a technology to be used, its functionality must be a good fit with the task characteristics (Zigurs & Buckland, 1998). TTF has been adopted to examine the fit of different technologies, such as information and communication technologies (e.g., video conferencing, email, instant messaging) (Maruping & Agarwal, 2004), group support systems (Dennis et al., 2001), personal digital assistants for e-commerce (Lee et al., 2007a), enterprise resource planning (ERP) systems (Wu et al., 2007), and mobile information technologies (e.g., laptop, smartphones, tablets) (Gebauer et al., 2010). The strength of TTF lies in its analysis of the three technology use components, as proposed by Burton-Jones and Straub (2006): the user, the technology, and the task characteristics. One of the disadvantages of TTF is that it does not consider contextual factors such as the broader sociocultural context affecting the relationship between

users and technologies. The theory suggests there is a static view of the interaction between technology and tasks that overlooks user improvisation with the technology to utilise it beyond its intended purpose.

Actor-network theory (ANT) is another lens that has been widely used to study technology use, mostly at the individual but also at group and organisational levels. ANT explores the association between human and non-human actors by tracing and explaining the networks of alliance and conflict among them (Cresswell et al., 2010). The theory emphasises agency when analysing the relationship between humans (users) and technology (non-human actors) by focusing on the symmetrical treatment of their agencies (Latour, 2005). ANT is primarily used within the social studies of science and technology to examine the adoption and use of technologies such as e-commerce (e.g. computers and communication technologies) by small and medium enterprises (Tatnall & Burgess, 2005), the use of health information systems (e.g. radiology network systems) within a hospital (Cho et al., 2008), the use of district-level geographical information systems in India (Walsham & Sahay, 1999), and the introduction of electronic health record systems in England (Cresswell et al., 2010). The main advantage of ANT is its relational treatment of human and non-human actors by not privileging either and proposing they have their own agencies (Walsham, 1997). Yet ANT is descriptive in nature, focusing on the relationships between actors rather than explaining how these relationships emerge. According to Sovacool and Hess (2017), ANT's overemphasis on such associations and its ignorance of the wider context hinders its ability to explain how and why technologies might be used differently in different contexts.

The *practice lens* is another theoretical lens that has been adopted to examine technology use at the individual level. The practice lens seeks to understand actors' behaviours within a particular context (Reckwitz, 2002). This lens views technology use as a practice and focuses on understanding what people do with the technology in their everyday activities (Orlikowski, 2000). The practice lens has been employed to understand the use of an array of technologies, such as the use of groupware by

individuals within organisations to support their interactions (Orlikowski, 2000), the use of web-based electronic services in the healthcare insurance context (Naidoo & Leonard, 2010), the use of web-based information systems within public health administration (Vaast & Walsham, 2009), and the use of an ERP system (clinical information system) in a university hospital (Oborn et al., 2011). The primary advantage of practice theory is its assumption that actors' behaviours are driven by beliefs, values and taste, rather than by attitudes and intentions (Sovacool & Hess, 2017). Hence, it reflects the dynamic and relational interaction between individuals and the social context by recognising that practice and the social context are mutually shaping (Feldman & Orlikowski, 2011). Nevertheless, practice theory has a number of drawbacks: (1) decentring technology features and focusing on the social aspect of technology use; and (2) conducting practice-focused inquiry requires deep immersion in users' everyday lives, which dictates the use of specific methods such as ethnography and observation to capture the interactions and practices they enact (Feldman & Orlikowski, 2011); this can be difficult to maintain in some contexts (e.g., capturing digital interactions between people online).

The *technological frames* lens is another approach to examining technology use. Technological frames are a particular type of cognitive frame, which is a theoretical lens that is widely deployed in organisational studies to understand strategic action (Cornelissen & Werner, 2014). As applied to the study of technology use, the purpose of the technological frames lens is to explain how users assumptions, knowledge and expectations about technology shape their behaviours and, thus, their patterns of technology use (Orlikowski & Gash, 1994). The technology frames lens conceptualises the relationship between users and technologies by considering users' interpretations of the technology. This lens draws on users' cognition, and it has been developed to explain both individual users and social groups' construction of meanings and interpretations of technology (Cornelissen & Werner, 2014; Davidson, 2006). The technological frames lens has been employed to examine the assumptions, expectations and interpretations that users have about various types

of technologies, including the investigation of diverse organisational stakeholders' interpretations of groupware (Orlikowski & Gash, 1994), the implementation and use of IT in small businesses (McGovern & Hicks, 2004), the use of e-procurement systems (Mishra & Agarwal, 2010), the use of mobile email devices (Mazmanian, 2013), and organisation-wide IT (e.g., human resources, payroll) (Olesen, 2014). The key advantage of technological frames is its proposition that the ways in which users frame technologies are flexible and change over time, making space to account for the changing nature of technologies and user's interpretations of technologies (Orlikowski & Gash, 1994). One major drawback of the technological frames lens lies in its emphasis on cognitive aspects (i.e., social aspects of technology use), such as interpretations, expectations and values, overlooking the role of technology (i.e., the material aspect of technology use) in the process of constructing these frames.

Lastly, *technology affordances* is a prominent lens that looks at technology use at the individual level. The main goal of technology affordances is to explain how users interact with technology to pursue their goals (Markus & Silver, 2008). The technology affordances lens concentrates on users' goals as a way to conceptualise the relationship between users and technologies (Strong et al., 2014). The underlying assumption of technology affordances is that users come to the technology with different goals and perceive the technology as offering various action possibilities (Leonardi, 2010). The technology affordances lens has been widely used to examine the use of a variety of technologies, ranging from electronic health records (Strong et al., 2014) and computer simulation technology (Leonardi, 2013b) to social media (Karahanna et al., 2018), blockchain (Du et al., 2019) and virtual and augmented reality (Steffen et al., 2019). The key benefit of technology affordance stems from its focus on the relationality between the user's goals and technology features, which is helpful for explaining the different ways users can utilise the same technology. However, the technology affordances lens – similar to other individual-level theories – has been criticised for neglecting the broader context that shapes the relationship between users and technologies (Seidel & Berente, 2013).

2.2.5.2 Field/societal level theories

Structuration theory is one of the influential theories linking individuals' interactions with the wider social structure. Structuration theory is a social theory developed by Giddens (1986), the main proposition of which is that social action is shaped by structures (rules and resources) and, at the same time, social action is the means of production and reproduction by these structures. DeSanctis and Poole (1994) adapt structuration theory to IS research to explain how actors incorporate technologies into their work practices, emphasising the social structures and their role in shaping the interactions between users and technologies. Structuration theory has been used in IS research to examine the interaction between users and a wide variety of technologies including group support systems (Miranda & Bostrom, 1993), computer-aided design systems (Brooks, 1997), health information systems (Bernardi, 2017), personal digital assistants (Sergeeva et al., 2017) and social media (Köse et al., 2018). One of the distinguishing features of structuration theory is the fact that it links the micro individual/group level and the macro level social structure by proposing that human actions simultaneously shape and are shaped by the social and institutional contexts (Pozzebon & Pinsonneault, 2005). One important challenge associated with applying structuration theory is that it often privileges human agency and assumes that technologies have no agency, thereby adversely affecting the theory's ability to account for the flexible and dynamic interaction between human and technology agencies (Leonardi, 2013a; Jones & Karsten, 2008).

Culture theory is among the principal theories applied to examine the effects of cultural context on technology use (Jackson, 2011). Culture theory aims to explain actors' behaviours within a cultural context (Keesing, 1974). The theory focuses on the shared values, beliefs, assumptions and norms that actors draw on as cognitive structures that shape their behaviours (i.e. technology use) (Leidner & Kayworth, 2006). According to Leidner and Kayworth (2006), in information systems studies, culture theory has mainly been used to investigate the effect of national culture on technology use, although it can also be used to study the effect of culture on

technology use at the organisational and group (subunit) levels. Culture theory has been applied to investigate the influences of culture on the use of different technologies, including computers (Kanungo, 1998), the internet (Loch et al., 2003), group support systems (Chung & Adams, 1997), enterprise systems (Vos & Boonstra, 2022) and blockchain (Salcedo & Gupta, 2021). The value of culture theory lies in its ability to link the cultural context (national, organisational, or group level) with an actor's sensemaking and patterns of technology use (Kappos & Rivard, 2008). It can thereby explain the diverse uses of the same technology as it postulates that people embedded in different cultures utilise the same technology differently due to the discrepancies in the values, assumptions, beliefs and symbols pertinent to their cultures (Robey & Rodriguez-Diaz, 1989). One of the primary limitations of culture theory is the fact that it considers culture as unified and shared equally among actors, ignoring individual differences and the contested nature of some cultural aspects where certain individuals might depend more on particular cultural values, beliefs, assumptions and expectations in relation to the technology (Jackson, 2011).

Institutional theory also explains actors' (organisations or individuals) behaviour (DiMaggio & Powell, 1983), examining the influence of the institutional context elements (i.e., regulative, normative and cultural-cognitive) in shaping actors' actions (Scott, 2013). Perhaps one of the most widely used variants of institutional theory in IS research is the institutional logics perspective (Thornton & Ocasio, 2008). The core assumption of the institutional logics perspective is that actors' actions are shaped by a multiplicity of socially constructed values, assumptions, rules and practices (Thornton et al., 2012). The institutional logics perspective has been adopted to examine the influence of institutional logics on the use of different technologies, such as electronic health records (Baroody & Hansen, 2012), enterprise systems (Berente & Yoo, 2012), human resource information systems (Bunduchi et al., 2020), digital platforms (Qiu et al., 2017), telemedicine (Chandwani & De, 2017) and social media (Karanasios et al., 2024). One important contribution of the institutional logics perspective is its ability to link local behaviours with the socially constructed values,

assumptions and beliefs that give meaning and guide actors' behaviours (Thornton & Ocasio, 2008). While institutional logics might share similarities with culture theory, they differ in that culture theory focuses on taken-for-granted values, while institutional logics focuses on explaining how and why cultural aspects are taken for granted (Jacks, 2017). Despite its usefulness, one limitation of institutional logics is that it only accounts for the cultural elements that affect behaviour and it overlooks the technology features and their effects on actions.

Section 2.2.5 has briefly discussed the potential theories that can be applied to study technology use at multiple levels. Previous research into technology use has acknowledged the importance of accounting for the materiality of the technology (i.e., its features) in shaping users' interactions with the technology (Leonardi & Barley, 2008; Orlikowski & Scott, 2008; Robey et al., 2013). Some of the theories reviewed in this section privilege the role of users in explaining technology use (e.g., practice lens and structuration theory), while others completely ignore the role of technology materiality (e.g., TAM, UTAUT, technological frames); the technology affordance lens, however, adequately considers both users and technology materiality by suggesting that technologies have features that enable users to achieve their goals. The materiality of technology highlights the importance of accounting for the nature of the technology under study and enables us to understand how technologies provide different ways of doing things (Leonardi & Barley, 2008).

Recently, a new form of IT – digital technologies – has begun to proliferate in our everyday lives. Digital technologies such as social media, blockchain and cloud computing possess unique characteristics that differentiate them from previous generations of IT (Yoo, 2010). Such characteristics are likely to augment the complexity associated with the context in which their use takes place (Nambisan et al., 2019). The following section will discuss digital technologies and the characteristics that distinguish them from previous IT, as well as reviewing the applicability of existing theories in light of their unique characteristics.

2.2.6 Digital technologies versus IT

Over the last decade, there has been a proliferation of a new generation of technologies such as social media, digital platforms, blockchain, artificial intelligence (AI), virtual and augmented reality, the internet of things and cloud computing. Studies have variously referred to such technologies as “emerging technologies” (Baily et al., 2022), “generative technologies” (Yoo, 2013), “contemporary technologies” (Rotolo et al., 2015) and “agentic technologies” (Baird and Maruping, 2021), as well as, more commonly, “digital technologies” (Nambisan et al., 2019; Fitzgerald et al., 2014; Faulkner and Runde, 2019).

Existing Literature is, however, highly fragmented regarding the definitions of digital technologies, and in particular the distinction between these technologies and traditional forms of IT. While some research uses the term “digital technologies” to include all types of technologies and defines them as the combination of information, computing, communication and connectivity technologies (Bharadwaj et al., 2013; Gong and Ribiere, 2021), other research restricts the term of “digital technologies” to a subset of technologies, as described above. In this understanding, digital technologies are considered an evolved form of IT with new and different features, properties and possibilities (Baiyere et al., 2023; Bailey et al., 2019; Gillani et al., 2024; Baird and Maruping, 2021). This difference, compared to traditional IT, span multiple dimensions, for example, Bailey et al. (2019) propose that digital technologies are more intelligent and autonomous; they have higher ability to track, monitor, interpret and influence behaviours through leveraging the larger amounts of data; they are open and collaborative which encourages recombination of ideas enabling new innovations; and their rapid diffusion transforms how, when and where work gets done. For Baird and Maruping (2021) digital technologies’ ability to learn, adapt and act autonomously enable them to develop a joint agency with humans. Similarly, Baiyere et al. (2023) emphasises the ability of digital technologies to develop conjoined agency with humans, as well as the ability of these technologies to be constantly repurposed in different settings, to be combined with a wide range of

technologies functions, and to be replicated and integrated at a much lower cost and higher ease. Finally, for Yoo et al. (2010) and Nambisan et al. (2019), digital technologies are characterised by openness, generativity, and affordances which set them apart from traditional IT. The focus here is on two characteristics of digital technologies: openness (Nambisan et al., 2019; Bailey et al., 2019) in relation to the wide access to the technology by diverse users, and generativity (Yoo et al., 2010; Baiyere et al., 2023) in relation to the possibility for recombination and novel applications of the technology.

Openness has been defined in different ways in different contexts. For example, in open innovation literature, openness refers to the number of actors involved in the innovation process who collaborate toward common goals (Öberg & Alexander, 2019). Nambisan et al. (2019) define openness from a technological perspective to describe accessibility to the underlying architecture of a technology (i.e., source code). This definition overlaps with Yoo et al. (2010) and Kallinikos et al.'s (2013) reprogrammable properties that view digital technologies as accessible and modifiable by programs other than the ones governing their behaviours. According to Schlagwein et al. (2017), openness is a multidimensional concept that reflects multiple meanings: (1) accessibility and transparency to describe the nature of a specific resource (e.g. open source code or open application programming interface (API)), thus the wide access and use of a resource; (2) participation and inclusion, describing the nature of a process (e.g. open innovation and crowdsourcing), hence the ability to take part in a widely shared process; and (3) democratising or liberating, describing the intended effect on a certain domain (e.g. open government and open education).

In the context of this research, "openness" is used to refer to the wide involvement of a variety of actors in the use of a particular technology. This definition aligns with Schlagwein et al.'s (2017) second definition of openness as the participation in a process and focuses on the technology use process rather than involvement in the development process of the technology. For instance, technologies such as social

media or blockchain are widely used by globally dispersed users. This open participation in the use of digital technologies has contributed to their fast growth in terms of their number of users. Wikipedia is a good example of an open collaborative and content sharing platform enabling anyone to contribute and edit articles resulting in a wide range of content contributed by people with different backgrounds and interests.

The second characteristic of digital technologies is generativity. Generativity refers to the ability to create something (Thomas & Tee, 2022). In the context of digital technologies, Zittrain (2006, p. 1980) defines generativity as "a technology's overall capacity to produce unprompted change driven by large, varied and uncoordinated audiences". Yoo et al. (2012) describe generative technology as the technology's ability to be used in ways that the developer did not predict. According to Zittrain (2006), generative technologies have four main properties: (1) the technology enables uses that are difficult or impossible otherwise (capacity for leverage); (2) the technology is modifiable to a wide range of uses (adaptability); (3) the technology is easy to adopt, use and adapt and requires less of a skillset to realise its full potential (ease of mastery); and (4) the technology is widely accessible to users (accessibility). Generative technology is dynamic and borderless (Yoo, 2012), which enables users to produce new applications and possibilities that may lead to unexpected uses (Eck & Uebernickel, 2016). These innovative applications are not a response to specific needs; rather, they emerge from the interaction between diverse users and the technological resources available to them (Jarvenpaa & Standaert, 2018). Thus, generativity enables the technology to evolve beyond its intended purpose. For instance, social media platforms evolved from personal networking platforms to platforms utilised by companies to market their products and provide customer support.

This thesis follows research who differentiate between digital technologies and IT as representing distinct set of technologies (Yoo et al., 2010; Nambisan et al., 2019; Bailey et al., 2019; Markus and Rowe, 2023; Benbya et al., 2020), but consider this

distinction a matter of degree rather than an intrinsic nature of these technologies. Both digital technologies and IT are essentially composed of bitstrings made up of 0s and 1s (Faulkner and Runde, 2019), indicating a similarity in their nature. Hence, IT can also exhibit openness and generativity to some extent. For instance, open source software development projects, such as Linux, allows for the participation of many users in its development. Similarly, the modular architecture design that underpins any kind of IT, could be in principle recombined and repurposed for new uses (Yoo et al., 2010). Therefore, this thesis argues that the distinction between digital technologies and IT lies on their varying degrees of openness and generativity, with digital technologies exhibiting higher levels of both compared to IT. The argument put forward here is that these higher levels of openness and generativity heighten the complexity associated with the social and technological contexts of digital technologies, contrasting them with traditional forms of IT.

Both openness and generativity increase the complexity of the contexts in which digital technology use occurs. The openness of digital technologies means that a wide range of users with diverse characteristics, goals, skills and experiences, and embedded in different cultural and institutional contexts, are involved in the use of technology. The view of technology users as social actors suggests that users often operate in multiple social contexts, they play multiple social roles, such as employee, family member, friend, etc. (Lamb & Kling, 2003), and draw on different values, norms and goals that guide their interaction with the technology (Kappeler, 2019). Therefore, openness heightens the complexity of the social context as a wide array of users are embedded in different social contexts and draw on diverse values, norms and goals involved in the use of technology.

Generativity also suggests that the borders between the development and use of digital technologies are fluid and that technologies are constantly evolving and intertwining throughout their use (Yoo et al., 2010; Kallinikos et al., 2013). As a result of this dynamic nature, the features of various digital technologies are becoming overlapping or complementary in enabling users to achieve their goals. In the context

of multiple digital technologies, this dynamism in technology features and functionalities makes users' selection and use of one technology to perform a particular task a much more complex endeavour due to the numerous options available to them. This contributes to the complexity of the technological context characterised by multiple technologies that have multiple and constantly evolving features.

Table 2.1 compares digital technologies, such as the kinds of digital platforms considered in this thesis such as social media like Facebook, collaborative platforms like GitHub and communication platforms like WhatsApp, and "traditional" IT, such as enterprise resource planning (ERP), databases software like Access and email clients, in terms of their levels of openness and generativity and their implications for the complexity of contexts (both social and technological).

Table 2.1. Digital technology characteristics

Characteristics	**Digital technologies (e.g., social media)**	**Traditional IT (e.g., ERP)**	**The implications of the characteristics for the complexity of context**
Openness	Social media platforms have high levels of openness as they are available to a wide range of users from different social contexts	ERPs Have low levels of openness and are typically restricted to users within an organisation. Access is strictly controlled and often limited to specific roles.	Openness increases the complexity of social contexts as it invites diverse users from different social contexts to interact with the technology in different ways to pursue different purposes.
Generativity	Social media have high levels of generativity enabling a wide array of uses beyond their original intended function (e.g. organisations using Facebook pages to provide customer services).	ERP have low levels of generativity and new uses of the technology and innovations are typically limited within the scope of the core organisation functioning and driven by the organisation or the software provider	Generativity heightens the complexity of the technological context as the features of technologies are constantly evolving, making multiple technology features overlap or complementary, forcing users to compare multiple technologies.

Characteristics	Digital technologies (e.g., social media)	Traditional IT (e.g., ERP)	The implications of the characteristics for the complexity of context
		(e.g. inventory management).	

The increased complexity of the context (social and technological) triggered by digital technology characteristics has important implications for theory selection to examine digital technology use, and it calls for a reconsideration of existing theories and incorporation of theoretical frameworks accounting for these characteristics (Yoo, 2010; Mütterlein & Fuchs, 2019; Bailey et al., 2022). For instance, theories that put significant emphasis on cognition and individual attitudes and evaluations, including TAM and UTAUT, are contextually underdeveloped (Lamb & Kling, 2003) and assume that the intention to use a particular technology is based on users' judgement of the technology outcome. Consequently, if users perceive the outcome of using a particular technology to be positive, they will be more likely to accept and use the technology and reject it if they perceive the outcome to be negative (Hillmer, 2009). This assumption is challenged by the generative nature of digital technologies, which implies that the outcomes of using technologies are unpredictable; therefore, such theories might not be appropriate for studying dynamic and constantly evolving digital technologies. TAM, UTAUT and task-technology fit also rely on quantitative measures, which are useful for explaining why people use a particular technology, but they fall short in capturing how people actually engage with the technology.

The applicability of theories favouring particular methodologies, including ethnography and observation, such as practice theory, ANT and structuration theory, might be challenged due to the openness of digital technologies where users are dispersed, which makes it difficult to follow such methodologies and understand how users engage with digital technologies. Technological frames and technology affordances are potential lenses that can explain users' interactions with technologies in a context characterised by increased openness and generativity; they do so by looking at users' interpretations and goals respectively. However, all these

lenses still ignore the macro-level contextual factors that affect the user-technology interaction, such as culture and institutional norms. Lastly, while structuration, culture theory and institutional logic are suitable theories to link technology use with macro-level structures, they all ignore technology features, which are imperative to capture in the context of generative technologies characterised by evolving features and functionalities.

Although the theories and lenses discussed in this section have proven their usefulness in examining "traditional" IT use, recent literature on digital technologies argues that conducting a single-level analysis is insufficient and might offer a restricted and incomplete understanding of digital technology use (Nambisan et al., 2019; Burton-Jones & Gallivan, 2007). Such research calls for the incorporation of multi-level analysis to capture the complexities inherent to digital technologies. As a result, there have been various efforts made in the literature to integrate different theoretical lenses that operate at multiple levels to capture the big picture of technology use. Such studies have integrated a practice lens with structuration theory (Orlikowski, 2000), affordances with cultural theories (Oshlyansky et al., 2004; Kaptelinin & Nardi, 2012), and institutional logics with sensemaking (Jensen et al., 2009; Linderorth, 2017), organising vision (Bunduchi et al., 2020) and affordances (Hultin & Mähring, 2014). Accordingly, this research conducts a multilevel analysis of digital technologies to understand their use in socially and technologically complex contexts. To achieve this research aim, two research questions are proposed to address the influence of socially and technologically complex contexts on patterns of digital technology use:

1. How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?
2. How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals?

2.3 Theoretical Framework

To answer the proposed research questions, this thesis draws on technology affordances as the underpinning lens because this is the only theory among those reviewed above that pays significant attention to the materiality of the technology by focusing on the technology content (i.e., technology features). Considering technology content is important when examining technology use and this may be even more important when explaining how users interact with numerous technology features to achieve their goals. Given that the second research question also pertains to technological complexity characterised by a multiplicity of technologies, the technology affordance lens is able to address this complexity of the technological context by accounting for the features of multiple technologies and explaining how the affordances of multiple technologies emerge from the interaction between users and the features of multiple technologies.

While the technology affordances lens is able to address the technologically complex context, it lacks the conceptual apparatus to account for the socially complex context proposed in the first research question. Several theories qualify for considering the complexity of the social context shaping technology use, including technological frames, which considers users' interpretations, assumptions and knowledge (Orlikowski & Gash, 1994); structuration theory, which focuses on macro-level social structures (DeSanctis & Poole, 1994); culture theory, which considers social values, norms and beliefs (Leidner & Kayworth, 2006); and institutional logics, which focuses on the socially constructed values, norms, assumptions, rules and practices (Thornton & Ocasio, 2008) that inform the actions of social actors.

However, the institutional logic perspective is regarded as the most appropriate in the context of this research for two reasons. First, the institutional logics perspective not only considers the social values, norms, rules and expectations that inform social actors' actions, but it also serves to explain how these macro-level factors are linked with micro-level actions. The main assumption of institutional logics is that actors are

embedded in multiple institutional logics (i.e., multiple social contexts) with different values, norms and beliefs (Thornton & Ocasio, 2008). This assumption helps to address the complexity of the social context that arises from the multiplicity of institutional logics shaping what actors focus on and influencing the actions they take within a particular institutional context. Second, the institutional logics perspective has been combined with the technology affordance lens in recent research, which allows us to build on existing research combining the two perspectives. This research has shown the potential of integrating the two lenses to better understand technology use (Hultin & Mähring, 2014; Seidel & Berente, 2013; Faik et al., 2020; Oborn et al., 2021; Bernardi et al., 2019).

Consequently, and to answer the first research question, the institutional logics perspective is combined with the technology affordances lens to constitute an integrated theoretical framework considering both the macro-level social structures (values, norms, assumptions, rules and practices conceptualised within the institutional logic perspective) and the micro-level actions (technology use conceptualised as the technology affordances to achieve actors' goals).

The following sections introduce the technology affordances and institutional logics perspectives, explaining their main concepts and tenets, highlighting their strengths and weaknesses, and discussing the gaps in existing research that integrates them together.

2.3.1 Technology affordances lens

The theory of affordances was first introduced in ecological psychology by Gibson (1979). The theory refers to the relationship between an organism and the environment, specifically, what the environment "offers to the animal, what it provides or furnishes, either good or ill" (Gibson, 1979, p. 127). The affordance concept was later adopted in the design literature by Norman (1999, p. 11), who defines it as "a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used". This

adaptation of the affordance concept to the design literature highlights Gibson and Norman's differentiating views of affordances. Gibson's view of affordances focuses on direct perception, suggesting affordances are apparent to actors and their perception does not require internal processes and mental calculations (Şahin et al., 2007; Burlamaqui & Don, 2015). In contrast, Norman deviates from direct perception and the purely perceptual view and emphasises the cognitive aspects of affordances (Harwood & Hafezieh, 2017; McGrenere & Ho, 2000). Norman (2002, p. 219) states that "affordances result from the mental interpretation of things, based on past knowledge and experience applied to our perception of things".

The affordance concept has undergone continuous refinement, especially within IS literature, where, in response to the early deterministic view and overly socialised view of technology, there has been significant efforts to dissolve the boundaries between the technical and the social aspects when examining technology (Leonardi & Barley, 2008; Orlikowski & Scott, 2008). Technology affordance in IS research is generally defined as the "possibilities for goal-oriented action afforded to specified user groups by technical objects" (Markus & Silver, 2008, p. 622). In some interpretations, affordances also include technological constraints, as these action possibilities may be hindered by technology (Leonardi, 2011).

Technology affordances are relational and are neither object-dependent nor subject-dependent (Hutchby, 2001; Weichold & Thonhause, 2020). Affordances depend on the complementarity between actors' ability to perceive action possibilities and what the object affords them (Michaels, 2003). Thus, different actors perceive different affordances of the same object based on their goals, experience, culture, social context and intentions (Gaver, 1991; Hutchby, 2001). However, the existence of affordances is independent of these factors; affordances are invariant and do not change as the goals of the actor change (McGrenere & Hu, 2000). Affordances also emerge from the mutual relationship between the technology's properties and the users' capabilities, which together define what the technology can be used for (Norman, 2013). Consequently, the technology can afford different action

possibilities for diverse users depending on their goals and their ability to perceive its affordances (Essen & Varlander, 2019).

Technology affordances are not actions; they are action possibilities whether they are carried out by individuals or not and these action possibilities are necessary conditions for an action to occur (Cabiddue et al., 2014; Markus & Silver, 2008). Hence, to transform affordances into actions, users must make use of one or more of the action possibilities offered by the technology to achieve a particular outcome, which is referred to as the process of "affordance actualisation" (Strong et al., 2014; Du et al., 2019). Anderson and Robey (2017) introduce the concept of "affordance potency", which precedes affordance actualisation. They define affordance potency as "the strength of the relationship between the abilities of the individual and the features of the system at the time of actualisation, conditioned by the characteristics of the work environment" (p. 103). The strength of this relationship is determined by the amount of effort and mental and physical energy needed to actualise the affordance and this is conditioned by three factors: users' abilities, technology features and context (Anderson & Robey, 2017).

While Gibson (1979) assumes that affordances are binary, meaning they either exist or they do not, several other authors challenge this assumption and argue that affordance actualisation depends on the degree of effort the user invests in actualising an affordance (Bernhard et al., 2013; McGrenere & Ho, 2000; Anderson & Robey, 2017). For example, McGrenere and Ho (2000) assert that affordance lies on a continuum with varying degrees of difficulty. Using the example of the climbability of stairs, McGrenere and Ho (2000) argue that one stair may be easily climbable, but another stair may be difficult to climb. Similarly, the concept of affordance potency suggests that affordances exist on a spectrum between strong and weak, where the more potent the affordance, the more likely it is to be actualised (Anderson & Robey, 2017). An affordance with strong potency refers to when the technology is easy to use and compatible with users' skills and abilities, its features can facilitate the achievement of particular goals, and the context is adequate to actualise affordance

in certain situations; an affordance with weak potency is when the technology is difficult to use and requires additional training or experience, its features are ineffective at achieving goals, and the context is inadequate to actualise the affordance in certain circumstances (Vila-Pozo et al., 2022).

Previous research has delineated different types of relationships between technology affordances. For instance, Gaver (1991) describes relationships between affordances as either nested or sequential. Nested affordances refer to the affordances that comprise multiple affordances, suggesting they exist in a hierarchy: a higher-level affordance contains multiple lower-level affordances. For example, email offers users the possibility to communicate (high-level affordance), and this communicating affordance consists of lower-level affordances such as typing and editing messages and attaching files, which are all nested into the higher-level affordance. Gaver (1991) also describes the sequential relationship between affordances and uses the term "sequential affordances" to denote that actualising one affordance leads to actualising a new affordance. Strong et al. (2014) further outline the dependent relationship between affordances where actualising one technology affordance requires actualising a preceding affordance. Terms such as "collective affordances" (Leonardi, 2013b) and "affordance networks" (Burton-Jones & Volkoff, 2017) are used to illustrate the aggregation of different affordances to achieve a broader group or organisational level goals.

While affordances refer to the properties of the actor-environment relationship (Stoffregen, 2003), there have been some attempts to extend the application of the affordance concept to describe the action possibilities afforded by the context or the environment in which goal-oriented actors are embedded. For example, the affordance concept has been applied to describe action possibilities offered by perceiving other people's actions and interactions within a particular social context, referred to as "social affordances" (Kaufmann & Clément, 2007; Valenti & Gold, 1991; Sileno et al., 2014). Autio et al. (2018) introduce the "spatial affordances" concept to denote the possibilities for entrepreneurial initiatives that the regional concentration

of knowledge clusters afford to entrepreneurial actors. van Dijk et al. (2011) develop the concept of "micro-institutional affordances" to explain how the various regulative, normative and cognitive institutional elements that characterise complex organisations afford different action possibilities to organisational actors to engage in radical innovation. Recent research proposes that digital technologies are characterised by multiple affordances that span multiple levels (Nambisan et al., 2019). For example, affordances actualised at the individual level might have implications for the actualisation of collective affordances, which in turn enable organisations to achieve their goals.

A large and growing body of literature investigates digital technology affordances. Some studies focus on identifying affordances associated with particular types of digital technologies, such as social media (Treem & Leonardi, 2013; Oostervink et al., 2016; Karahanna et al., 2018), blockchain (Du et al., 2019), mobile technologies (Cousins & Robey, 2015), virtual and augmented reality (Steffen et al., 2019), Wikipedia (Mesgari & Faraj, 2012) and wearable technologies (Benbunan-Fich, 2019). Other studies identify phenomenon-specific affordances, including digital technologies affordances for knowledge sharing (Majchrzak et al., 2013; Gibbs et al., 2013), knowledge collaboration (Faraj et al., 2011), organising (Leonardi & Vaast, 2017), political movement (Sæbø et al., 2020), identity construction (Khazraee & Novak, 2018) and cyberbullying (Chan et al., 2019). There is no established and uniform way to identify technology affordances in the literature, as studies use different terminologies to denote the same affordance, such as the possibility of adding, removing, modifying or reviewing shared content being labelled as "editability" (Treem & Leonardi, 2013) and "reviewability" (Faraj et al., 2011). Table 2.2 presents the most common technology affordances reported in the literature.

Table 2.2. Digital technology affordances in the literature

Affordance	Definition
Communication (Karahanna et al., 2018)	The possibility of talking and interacting with other users

Affordance	Definition
Visibility (Leidner et al., 2018; Treem & Leonardi, 2013; Oostervink et al., 2016)	The possibility of making users' content, behaviours, profiles and contributions available to others
Persistence (Cabiddu et al., 2014; Treem & Leonardi, 2013; Oostervink et al., 2016)	The possibility for users' contributions to remain accessible
Editability (Treem & Leonardi, 2013); reviewability (Faraj et al., 2011); contribution (Mesgardi & Faraj, 2012)	The possibility for adding, removing or editing users' context and contributions.
Management (Mesgardi & Faraj, 2012)	The possibility of organising the community and its members
Networking (Leidner et al., 2018); connecting (Sæbø et al., 2020); associating (Treem & Leonardi, 2013)	The possibility for connecting, interacting and building relationships with others
Triggered attending (Majchrzak et al., 2013); triggered actions (Sæbø et al., 2020); notified attention (Oostervink et al., 2016)	The possibility of receiving alerts on posts or comments when available
Self-representation (Karahanna et al., 2018; Mesgardi & Faraj, 2012)	The possibility of revealing information to other users
Collaboration (Mesgardi & Faraj, 2012)	The possibility of cooperating with other users on specific tasks or projects

Since technology affordances account for the relationship between technology features and users' goals to achieve a particular outcome (Du et al., 2019), there is some confusion in differentiating between affordances, technology features and outcomes in the literature (Leidner et al., 2018). While technology features are the technical functionalities built into the technology and they are properties of the technological artefact (Majchrzak & Markus, 2012), affordances outcomes are the results expected from actualising the technology affordances (Strong et al., 2014). Leidner et al. (2018) critique prominent studies on technology affordances for conflating affordances, technology features and outcomes. For example, they challenge Treem and Leonardi's (2013) labelling of "persistence", "visibility", "editability" and "association" as affordances, arguing that these are simply features of social media. They also criticise Strong et al. (2014) for identifying "capturing data and archiving digital data" as an affordance, claiming that it is a direct use of technology features. In their research, Leidner et al. (2018) distinguish between the

three concepts to avoid this conflation by creating a table that differentiates between the technology features, uses, affordances and outcomes.

Most of the research presented in Table 2.2 that examines digital technology affordances does so by focusing on the affordance of a single technology or a specific category of technologies. For example, some studies look at Facebook and Twitter (Sæbø et al., 2020; Treem & Leonardi, 2013) and identify the affordances of the social media as a whole but they do not identify the affordances of each technology. In the same way, Cousins and Robey (2015) identify the affordances of mobile technologies (e.g. laptops and smartphones) but do not relate the identified affordances to each technology. Such a focus on a single technology (or technology category) affordance may overlook the complexity of the technological context where different technologies offer multiple, sometimes similar affordances by which users might simultaneously take advantage of multiple technology affordances. Figure 2.1 illustrates the distinction between examining single and multiple technology affordances. The traditional approach to examining single technology affordances is based on analysing the interaction between users' goals and technology features (box A in the figure). When users have multiple goals, they perceive the same technology as providing different affordances. In contrast, when examining multiple technologies' affordances (box B in the figure), the user might consider the features of different technologies and leverage their affordances to achieve their goals. Therefore, what is missing in existing technology affordance and what is inadequately articulated is an understanding of how and when users choose to leverage one technology affordance over another or leverage multiple technology affordances simultaneously to achieve the same goal.

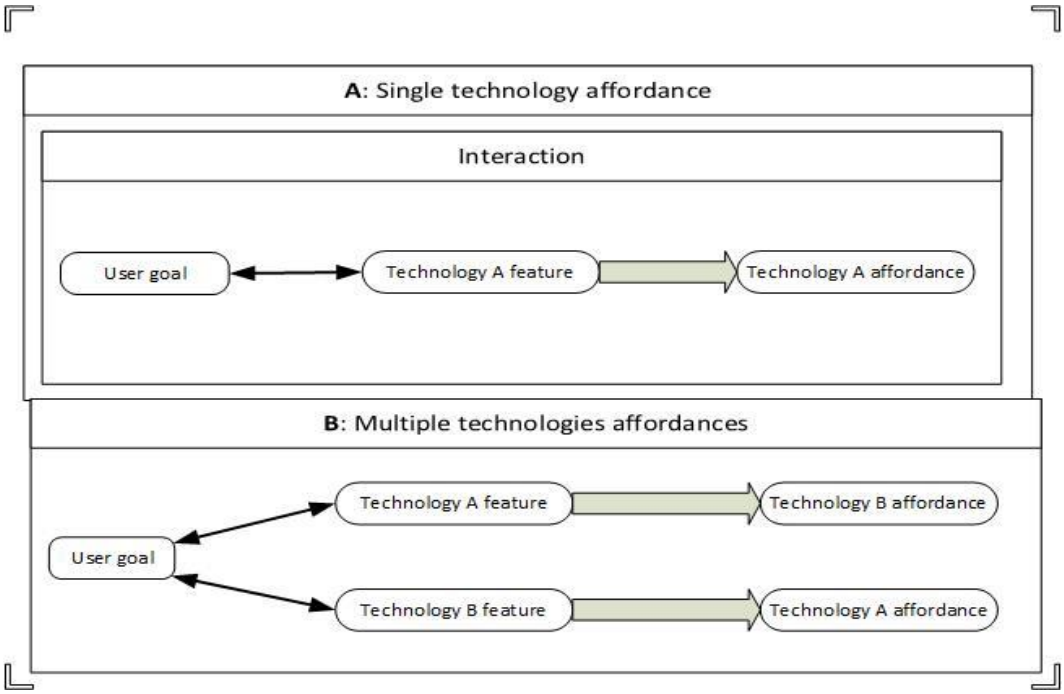


Figure 2.1. The difference between single technology affordance and multiple technology affordances

Although there is abundant research on technology affordances within IS research, the affordance lens has been challenged for its narrow focus on micro-level technology use and its lack of consideration of the macro-level context in which technology use takes place (Seidel & Berente, 2013; Oostervink et al., 2016). Existing research emphasises that affordances are shaped by the historical, social, institutional and cultural context in which they are embedded (Sæbø et al., 2020; Seidel & Berente, 2013). Similarly, Strong et al. (2014) argue that macro-level institutions play a significant role in affecting affordance perceptions. Therefore, given the open nature of digital technologies that draw in a variety of users who are embedded and interact in multiple social contexts, and who are driven by diverse goals and follow diverse sets of principles and rules in multiple contexts (Yoo, 2010; Lamb & Kling, 2003), the technology affordances lens alone is insufficient to capture this social complexity. As a result, the institutional logic perspective is introduced as

a macro-level lens, which is combined with a technology affordances lens to address its limitations and answer the first research question.

2.3.2 Institutional logics perspective

Institutional theory has a longstanding interest in understanding how organisations adopt similar practices and procedures based on established rules to gain legitimacy and ensure their survival (Meyer & Rowan, 1977). The theory focuses on isomorphism and suggests that organisations become similar by conforming to the pressures of the institutionalised rules of the external environment (Bunduchi et al., 2008). DiMaggio and Powell (1983) extend the institutional isomorphism concept by identifying three sources of isomorphism: coercive (originating from laws, regulations or pressures imposed by other organisations), normative (pressures from norms, values and standards proliferating in the field) and mimetic (imitating and copying the practices of other organisations that are more legitimate). Based on this, the institutional logic perspective is formulated by Friedland and Alford (1991) as a new approach to institutional analysis that moves beyond isomorphism to focus on the influence of multiple institutions in different contexts that are available to actors (individuals and organisations), which shape their preferences and behaviours.

Institutional logics are defined as the "socially constructed, historical patterns of cultural symbols and material practices, including assumptions, values, and beliefs, by which individuals and organisations provide meaning to their daily activity, organise time and space, and reproduce their lives and experiences" (Thornton et al., 2012, p. 2). Institutional logics are sets of values, meanings, norms and rules representing a frame of reference that guides actors' sensemaking processes and how they act (Cloutier & Langley, 2013). Logics define the "content and meaning of institutions" (Thornton & Ocasio, 2008, p. 100) and provide both formal and informal rules of action and vocabularies of motives and identity that enable or constrain actors' decision-making (Thornton & Ocasio, 1999). Thornton and Ocasio (2008) identify the mechanisms by which logics impact the actions of actors (i.e. macro-to-

micro), including identification with institutionalised groups or professions that follow a particular institutional logic; competition for power and status – logic shapes the rules in which power and status are created and maintained; classification and categorisation – logics provide actors with the taken-for-granted social classification that categorise social actors; and attention – logics focus an actor's attention, dictating which problems and solutions get attended to in a particular situation.

While the institutional logics perspective was initially developed to study institutions at the societal level (Friedland & Alford, 1991), it proposes that institutions operate at various levels of analysis, including individual, group or department, organisational, community and field level (Thornton et al., 2012). One of the key premises of the institutional logics perspective is the concept of embedded agency, which links the broader institutional context to the micro-level practices. The notion of embedded agency highlights that values, assumptions, goals and rules are embedded within prevailing institutional logics and the actions of actors are the result of the interaction between the actor's agency and institutional structure (Thornton & Ocasio, 2008). Embedded agency proposes that actors are not passive followers of institutional scripts and instead they actively exercise their agency to change the institutions (Seidel & Berente, 2013). Thus, while actors are embedded within the prevailing institutional logics and consistently reproduce the behaviours of existing institutional logics, institutions are socially constructed, and actors have partial autonomy and the capacity to innovate and change institutional logics (Thornton et al., 2012). This relational view of institutional logics is crucial for linking local actions at the micro level with wider institutions at the macro level.

The institutional logics perspective is useful for examining the influence of multiple social contexts on actors' behaviours by viewing society as an interinstitutional system where different "institutional orders" exist. Each institutional order is associated with a unique logic that defines the different principles, practices and cultural norms that influence the actions of actors (Thornton & Ocasio, 2008). Thornton et al. (2012) propose a typology of institutional orders, including family,

religion, state, market, profession, corporation and community, offering a frame of reference that guides actor choices and decisions. These orders can be merged or instantiated into more context-specific logics, giving researchers flexibility in adapting the concept in different settings (Cloutier & Langley, 2013). For instance, "family business logic" can be seen as a hybrid logic between "market logic" and "family logic" (Purdy et al., 2019). Georgio and Arenas (2023) similarly review organisation and management studies on communities and propose four distinct variants of the community logic: communities of place (formed around geographic location), communities of practice (formed around a profession), communities of users (formed around users of products and services), and communities of firms (formed around collaborative relationships between firms in a field). Each variant has a distinct set of components that set them apart.

The process of identifying institutional logics can entail specifying their components or dimensions. Thornton et al. (2012) identify nine key categories that represent the practices and cultural symbols defining each institutional logic that researchers can apply to help capture and distinguish the different institutional logics. Nevertheless, some institutional logics scholars tend to identify logics by describing the logic's aims, practices and rules (e.g., Goodrick & Reay, 2011), while others have applied some of Thornton et al.'s (2011) components to identify institutional logics based on their applicability to the context of their research (e.g. Berente & Yoo, 2012). Table 2.3 synthesises the common identifying components of institutional logics utilised in the literature.

Table 2.3. Institutional logic components in the literature

Research	Identified component	Definition
Berente and Yoo (2012), Berente et al. (2019), Tumbas et al. (2015)	Principles	Set of goals and values that are associated with specific logic (often goals and principles elements used interchangeably)
	Assumptions	The means of achieving the goals associated with the logic

Research	Identified component	Definition
	Identity	The role implied by the logic that actors may take (how actors identify themselves with the logic)
	Domain	The context or the field where actors enact the logic
Battilana and Dorado (2010), Beck et al. (2015)	Goals	Goals inscribed into the logic
Gawer and Phillips (2013), Oostervink et al. (2016)	Source of legitimacy	Where actors' actions and behaviours are seen as legitimate within their community or field (how actors are viewed as trustworthy and legitimate)
	Source of authority	Source of power and control (e.g., association with professional body or position in organisational structure)

One key assumption of the institutional logics perspective is that individual or organisational actors are often confronted by different prescriptions of multiple institutional logics (Vermeulen, 2016). This view has been described as "institutional complexity" (Raynard, 2016), "institutional multiplicity" (Greenwood et al., 2011), "institutional pluralism" (Kraatz & Block, 2008) and "constellation of logics" (Goodrick & Reay, 2011). The exposure to multiple institutional logics gives rise to challenges and tensions for actors exposed to them and generates complexity regarding which institutional logic to follow (Greenwood et al., 2011; Bunduchi et al., 2015). Complexity not only arises from the incompatibility of the multiple institutional logics prescriptions (Greenwood et al., 2011) but also from the presence of multiple institutional logics where the more logics are available, the more institutional demands there are to be met (Raynard, 2016). Different forms of complexity have been identified in the literature. For example, multiple institutional logics may contradict one another, generating pressure on actors to choose to follow one logic over another (Vermeulen et al., 2016); they may coexist over time, and actors may draw on them simultaneously (Goodrick & Reay, 2011); or they may be combined, leading to the emergence of a new hybrid logic (Battilana & Dorado, 2010). Besharov and Smith (2014) identify four typologies of logics multiplicity by examining the relationship between the logics (i.e. logics compatibility) and centrality of multiple

logics to organisation functioning (i.e. centrality): (1) contested multiplicity where logics are competing for dominance; (2) estranged multiplicity when a prevailing logic competes with other subsidiary logics; (3) aligned multiplicity when multiple logics coexist and are consistent without a clear hierarchy among them; and (4) dominant multiplicity where other subsidiary logics reinforces a dominant logic.

Generally, institutional theory has a long tradition in IS research where it is used to examine the role of the social context in explaining technology-related phenomena, including technology development, implementation and use (Mignerat & Rivard, 2009). The IS cultural and institutional research has shifted toward adopting the institutional logics perspective since its development in the early 2000s (Jacks, 2017). Within this stream of research, there are two key approaches to applying institutional logics to examine technology use:

1. Examining the effect of institutional logic on technology use (i.e., the macro-to-micro effect) (Currie & Guah, 2007; Linderoth, 2017; Baroody & Hansen, 2012).
2. Examining the role of technology use in influencing logics and creating institutional change (i.e., the micro-to-macro effect) (Hansen & Baroody, 2020; Slavova & Karanasios, 2018).

The majority of studies utilising institutional logic perspectives adopt the first approach, where their focus is on the macro-level influence of logic. Such studies find that the prevalent institutional logic influences the implementation and use of technologies. For instance, Currie and Guah (2007) study the shifts in the prevalent institutional logics within the National Health Service (NHS) in the UK across three eras, showing how contradicting institutional logics facilitated or hindered the implementation and use of a nationwide IT program. Similarly, Baroody and Hansen (2012) examine the use of electronic health records through an institutional logics lens and show how the conflicting and complementary relationship between multiple logics shapes the intensity of IT use in healthcare. Lindeorth (2017) combines the

sensemaking lens with institutional logics to study the use of video conferencing systems and finds that technology use is shaped by institutional logics and actors' sensemaking, and the influence of institutional logic on behaviour weakens when users perceive that the technology could solve their problems and improve their daily practices. McElroy et al. (2015) further explore how interdisciplinary research teams use information technologies to collect data to evidence their research effort and find that collaboration among team members is difficult due to the conflicting institutional logics characterising each discipline.

Within this macro-level approach, some studies have concentrated on actors' responses to institutional multiplicity (i.e., complexity). In their study of NASA's Enterprise Resource Planning (ERP) system implementation, Berente and Yoo (2012) highlight how actors manage multiple logics conflict by loosely coupling some of the dominant logic practices from the practices of the logic associated with the ERP system to satisfy both institutional demands. Similarly, Bunduchi et al. (2020) study users' responses to institutional complexity in the implementation of a nation-wide human resource information system and indicate that actors engage with different coping mechanisms (acquiescence, avoidance, defiance, compromise and manipulation) based on the congruence and intensity of logics.

The second research approach is concerned with the micro-level effect of technology use on institutional logics. This stream examines how the use of technology can transform institutional logics and lead to institutional change. For example, Slavova and Karanasios (2018) show how farmers' use of information and communication technologies led to institutional change. They regard the different technologies used by farmers as carriers of different institutional logics, demonstrating that farmers' mixing-and-matching in their use of these technologies resulted in the hybridisation of the two logics. Hansen and Baroody (2020) similarly explain how electronic health records (EHR) features and functionalities influenced the relationship between the multiple logics. They find that the use of the EHR system by diverse healthcare stakeholders enacted a wide range of practices that nurtured conflict and

complementarity between the multiple logics. Gozman and Currie (2013) find that the use of investment management systems facilitates the introduction of new institutional logics and results in institutional changes. They conclude that the systems were key in maintaining and enabling these logics-associated practices.

Although the institutional logics perspective – as a variant of institutional theory – has gained popularity among IS scholars interested in understanding how institutions shape and are shaped by technology use, it does not explain how users make sense of and engage with technology (Jensen et al., 2009). The institutional logic perspective tends to ignore the materiality of the technology (i.e., technology features), which is a crucial component of understanding technology use (Bernardi et al., 2019). The institutional logic emphasis on institutional factors such as cultural values and norms at the expense of technological factors provides a limited view of technology use. In response to such limitations, researchers opted to combine institutional logics with the technology affordances lens to examine technology use in particular contexts.

2.3.3 Combination of technology affordances and institutional logics

A decade ago, the limitations of the institutional logic perspective began to generate a stream of research that set out to combine institutional logic with technology affordances to build a theoretical framework that better explains the interactions between institutions at the macro level and technology use at the micro level. Within this stream, the majority of research focuses on examining the unilateral effect of institutional logics on technology affordances (Hultin & Mähring, 2014; Ingram et al., 2014; Oborn et al., 2021; Oostervink et al., 2016; Tumbas et al., 2015; King et al., 2022), while others acknowledge the institutional logics effect on affordances but their analysis concentrates on the recursive relationship between institutional logics and affordances and seeks to investigate how technology affordances can stimulate institutional change (Bernardi et al., 2019; Faik et al., 2020; Essen & Varlander, 2019).

Table 2.4 summarises these studies and their approaches to integrating the two theoretical lenses.

Table 2.4. Existing research approaches for integrating technology affordances and institutional logics

Level of analysis	Study	Approach
Macro-to-micro	Hultin and Mähring (2014)	Institutional logics focus users' attention on specific technology affordances (users actualise affordances that allow them to achieve goals associated with the logic they draw from)
	Oostervink et al. (2016)	Logics trigger users to actualise certain technology affordances (users act upon technology affordances to deal with the institutional pressure from multiple logics)
	Oborn et al. (2021)	The prevalent institutional logics guide the attention of users toward specific technology affordances
	Ingram et al. (2014)	Institutional logics shape the perception of technology affordances as they focus user attention on particular affordances consistent with the dominant logics
	Tumbas et al. (2015)	Institutional logics shape technology affordances leveraged by users and, at the same time, are shaped by them
	Seidel et al. (2016)	Institutional logics shape the affordances leveraged by users to enhance their identity
	King et al. (2022)	Different institutional logics shape the design of technology affordances
Micro-to-macro	Bernardi et al. (2019)	Uses identity work as a mechanism to bridge technology affordances and institutions in which technology affordances enable or constrain identity work that influences the deinstitutionalisation of the practices of dominant logic
	Essén and Värlander (2019)	Views technology as a mechanism that affords certain practices (material reconstruction, emergent use and discursive reconstruction) and those technology-afforded practices in turn transform the relationship between logic from competitive to reinforcement

Level of analysis	Study	Approach
	Faik et al. (2020)	Conceptualises technology affordances as a component of institutional logics (when actors draw on a specific logic, the logic focuses their attention on particular affordances; likewise, when users perceive the technology to afford practices consistent with that logic, the logic becomes more salient). They also propose that when technology affordances are scaled, they cause a shift in the centrality and compatibility of multiple logics, leading to institutional change.

Such studies have shown the applicability and usefulness of integrating the technology affordances and institutional logic lenses and contributed new frameworks to the literature that link technology use with its context of use. However, although they examine logics multiplicity, studies examining the macro-to-micro influence of logics share a common problem in associating specific affordances with particular institutional logics. For example, they associate "collaborative quality care" affordance with professional logic (Oborn et al., 2021) or link the "visualisation" affordance with project management professionalism logic (Tumbas et al., 2015). Yet, as discussed above, the institutional logic literature shows that complexity arises from the relationship between the multiple logics and their manifestation. Rynard (2016) and Bsharov and Smith (2014) emphasise the importance of looking at the configuration of logics (i.e., the relationship between multiple logics) at play as these configurations can shape actors' behaviours. Existing research that combines affordances and logics is inclined to focus on the "content" of institutional logics (i.e., their principles, rules, assumptions, etc.) and ignore the relationships among multiple institutional logics and how they are configured to influence the perception of technology affordances. By considering the relationship between multiple logics and technology affordances, we can better explain how the patterns of technology use differ across different contexts. Figure 2.2 highlights this research gap. The first approach in existing research integrates technology affordances with institutional logics by examining how specific institutional logics (at the macro level) influences

the perception of particular technology affordances (the right-hand side in Figure 2.2). The second approach investigates how leveraging specific technology affordances (at the micro level) influences institutional logics (at the macro level) (the left-hand side in the figure). Figure 2.2 shows the gap (highlighted in red) in our understanding of how configurations of multiple institutional logics shape the perception of technology affordances.

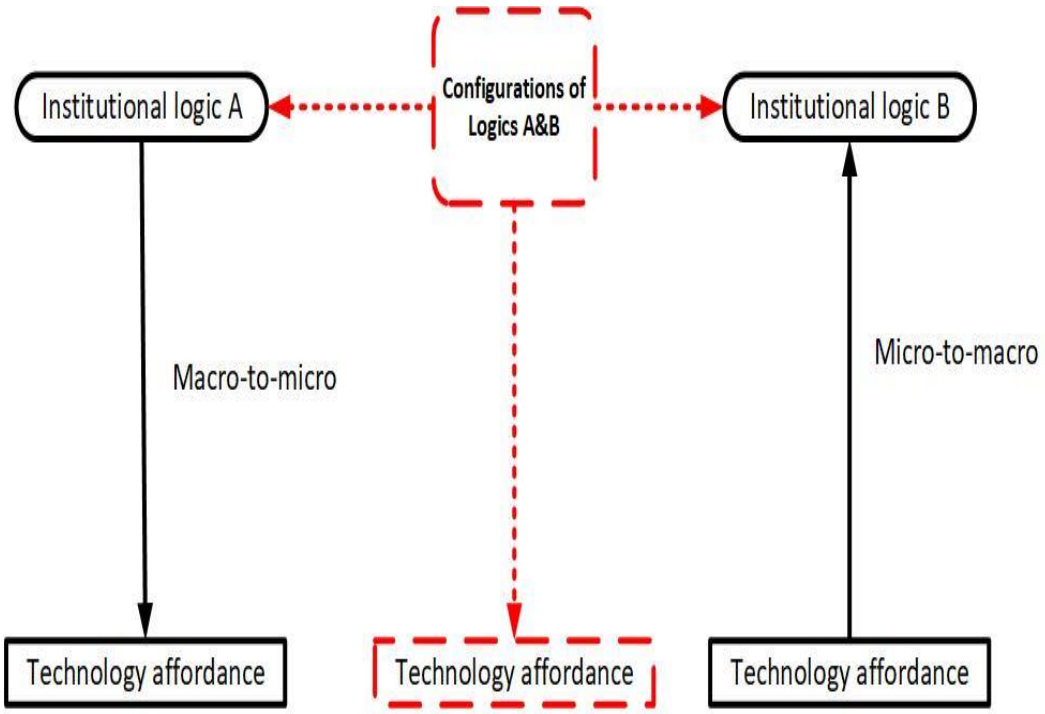


Figure 2.2. Th gap in existing research that integrates technology affordances and institutional logics

Most of these studies also examine technology use within an organisational context (except Ingram et al., 2014; Seidel et al., 2016) and consider traditional IT that was developed and used for a particular organisation(s) to serve particular purposes. Such IT used in an organisational context are usually closed systems, only accessible and used by organisational members. Therefore, traditional IT are less socially complex because such complexity is enhanced when more users draw on the technology, and the patterns of their social interaction take different forms in different contexts

(Kappeler et al., 2019). This is the case with digital technologies such as social media that are open to anyone from any context. Scheepers and Middleton (2013) argue that personal technologies (i.e., technologies that individuals utilise for their own personal purposes) are used in multiple contexts for multiple purposes, which leads to increased complexity that is relative to "*cross-context behaviours and related technology configurations*" (p. 383). Nevo et al. (2021) also criticise existing literature on technology affordances for equating individual users' goals with those of the organisations they belong to; they claim that personal goals are different from the goals of the role and they problematise existing models differentiating between these goals in relation to affordances. Therefore, focusing on the individual and voluntary use of digital technologies, this research seeks to integrate the technology affordances with the institutional logics perspective to explore the relationship between digital technology affordances and the multiplicity of institutional logics so we can address technology use in socially complex contexts and answer the first research question.

2.4 Conclusion

This chapter has introduced the key concepts and theoretical lenses used to examine the phenomenon studied here: digital technology use in socially and technologically complex contexts. While technology use has been studied extensively at the individual, organisational and field levels from a wide range of theoretical perspectives, most theoretical lenses do not account for the characteristics of the technology, nor do they support the integration of multiple levels of analysis. Digital technologies, which represent the focus of this research, possess unique characteristics that differentiate them from previous IT, including openness and generativity. These characteristics increase the social and technological complexity of the context in which digital technologies are used, thus calling into question the applicability of existing theories to examine their use. This leads to the two research questions developed in the thesis. To examine these research questions, this chapter proposes combining the technology affordance lens with the institutional logics

perspective to examine technology use in a socially complex context (research question 1) and drawing on the technology affordances lens to examine technology use in a technologically complex context (research question 2).

3 Chapter 3: Methodology

3.1 Introduction

The aim of this research is to examine the use of technology by individual users in socially and technologically complex contexts. Here, technology use is not simply conceptualised in terms of frequency (how many times the technology is used), duration (how long the use lasts) or the number of features utilised by users, which can be explored through a quantitative research approach. Rather, this research conceptualises technology use as the unfolding of the interaction between the users and technology (see Chapter 2, section 2.2.2), which enables us to discern the patterns of technology use in specific contexts. This focus on exploring the relationship between users and technologies, as well as the importance of context to the research objective, justifies the choice of interpretative qualitative research involving a single case study research design approach.

This thesis is composed of two empirical studies that answer the two research questions identified in the previous chapter:

1. How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?
2. How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals?

The aim of this chapter is to explain and justify the research approach, design and methodology adopted. The chapter is divided into six sections. The next section delineates the research approach followed, justifying the selection of interpretive qualitative research and a single case study research design based on the thesis aim. The third section describes the case study that this research draws on to answer the research questions, introducing Discord as the empirical setting for both studies and explaining why it represents a useful case for answering the research questions. The fourth section provides a detailed explanation of the data collection, describing the

data sources utilised and the selection criteria for participants for both empirical studies. The fifth section elaborates on the data analysis conducted in the thesis and the final section discusses the ethical considerations that shaped the conduct of the research.

3.2 Research Approach and Design

There are two general approaches to conducting scientific research: quantitative and qualitative (Bryman, 2012). The quantitative approach uses numbers and statistics in the data collection and analysis and relies on a deductive approach for theory testing (Bryman, 2012). Examples of methods associated with quantitative research include surveys, experiments, mathematical modelling and econometrics. Quantitative research is suitable if the aim of the study is to generalise the findings to a larger population or explore trends that apply across different contexts, yet this type of research overlooks the broader social and cultural context (Myers, 2020). A qualitative research approach uses text and other non-numerical data in the collection and analysis of the data and relies on an inductive approach to generate theory (Bryman, 2012). Examples of qualitative research methods include case study research, action research, ethnography and grounded theory. Qualitative research is suitable for understanding users' perceptions and evaluation of the technology, explaining users' behaviour when engaging with the technology, and understanding the influence of the broader context on technology use (Kaplan & Maxell, 2005).

Scientific research is generally associated with one of two main paradigms: positivist or interpretivist (Myers, 2020). The positivist paradigm assumes that reality is objectively formed and exists independent of the research (Myers, 2020). Positivist research is concerned with causal analysis of dependent and independent variables and aims to test theories and increase the predictive understanding of the phenomenon (Orlikowski & Baroudi, 1991; Iyamu, 2021). The interpretive paradigm holds that reality is subjective and socially constructed and, thus, the main goal of interpretive research is to "*understand how members of a social group, through their*

participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their social action" (Orlikowski & Baroudi, 1991, p. 13).

This thesis aims to understand digital technology use, which is defined in Chapter 2 as the relationship between technologies and users in complex contexts. The focus is on a communication platform (Discord, described in the next section) where users are members of various online communities, they come from diverse backgrounds and have diverse experiences, and they use Discord to achieve varied goals. As diverse users interact and socialise within these online communities, they form social structures that embed specific cultural norms, values, conventions and customs, which in turn shape how they behave (Faraj et al., 2016). This indicates that there is a particular way of thinking shared between users (i.e., community members) that can inform how they interact with the platform. Therefore, interpretive qualitative research aligns well with the thesis aims as it seeks to understand the phenomenon (technology use) within the context in which it exists from the participant's point of view (Orlikowski & Baroudi, 1991). This thesis follows the single case study research design to study Discord's use within its context. According to Yin (2018), case study research is relevant when the research questions seek to explain and understand complex social phenomena within their real-life context.

One major drawback of interpretive qualitative research and the single case study design is the difficulty of generalising the study's findings (Walsham, 1995; Yin, 2018). Addressing this criticism, Walsham (1995) proposes four types of generalisations that can be made in interpretive qualitative research: (1) the development of concepts that can be used by other research; (2) the generation of theoretical frameworks that can be used to guide future research in different areas; (3) particular implications in specific domains of action; and (4) rich insights on a wide range of topics beyond concepts, theories and implications that can offer valuable insights to the overall understanding of the topic. Gioia et al. (2013) also stress that it is possible to

generalise theoretical concepts from case study research that have some relevance to other domains.

3.3 Research Case "Discord"

This thesis uses the "Discord" platform as the empirical setting. Discord is a voice over internet protocol (VoIP) communication and social media platform that enables users to communicate through text, voice, video, emotes and media sharing and allows users to build their online communities. Discord was launched in 2015 with over 550 million[3] registered users and 150 million[4] concurrent monthly users. Discord is available to users in web browsers as an online application, desktop application (on Windows, macOS and Linux) and mobile application (Android and iOS).

Discord was initially developed and introduced for gamers to replace VoIP platforms such as Skype and TeamSpeak with a view to providing reliable, high-quality and low-latency voice calls. However, recently Discord's user base has grown significantly to include other users who utilise it for non-gaming purposes. The myriad feature sets and functionalities that Discord offers make it a versatile platform and attract a wide range of users. These users have adopted Discord for various purposes other than gaming, especially during the COVID-19 pandemic when there was a sharp increase in using online communication platforms for remote working, socialising and catching up with friends and family. Examples of such uses include students forming study groups, teachers providing virtual lectures and informal communication channels with students, software developers collaborating with other developers on development projects, content creators creating Discord communities to engage with their audience, and companies providing customer support. This vast uptake of Discord by non-gamers has led to updates in Discord's branding, encapsulated in the

[3] https://www.statista.com/statistics/1367922/discord-registered-users-worldwide/ (Accessed 6.12.2023)
[4] https://discord.com/company (Accessed 6.12.2023)

slogans “your place to talk”[5] and “imagine a place to talk and hang out”[6] to signify a shift from an exclusive focus on gamers to embracing broader audiences.

As a communication and social media platform, Discord is equipped with a rich set of features and functionalities that help users communicate and build their communities around shared interests. Figure 3.1 shows Discord’s interface using a template server tailored to a study group.

Users on Discord can privately communicate one-to-one through direct messages (similar to WhatsApp messages) or interact with larger online communities. These communities on Discord are called “Discord servers”. The column on the left-hand side of Figure 3.1 (circle number 1) shows the Discord servers the user is part of. Each server represents an online space for a group of people with similar interests. Hence, terms such as “server”, “community” and “space” are used throughout this thesis to denote an online community on Discord where users interact and socialise. Discord servers can be private, where other users are only able to join if the server owners have invited them, or they can be larger public servers open to anyone who wants to join. Discord servers also comprise multiple channels, similar to chat rooms or channels on Slack (circle number 2 in Figure 3.1 shows the channels of the selected Discord server). Channels on Discord can be text channels (e.g., the #general channel in the figure) to send text messages and share media, including images, emojis and files; voice channels to converse with others through voice, video or screen sharing (e.g., the Lounge channel with the speaker icon in the figure); and forum channels to create posts related to specific topics (e.g. the forum-discussion channel in the figure).

[5] https://discord.com/blog/your-place-to-talk (Accessed 6.12.2023)

[6] https://discord.com/blog/how-were-making-discord-more-welcoming-for-everyone (Accessed 6.12.2023)

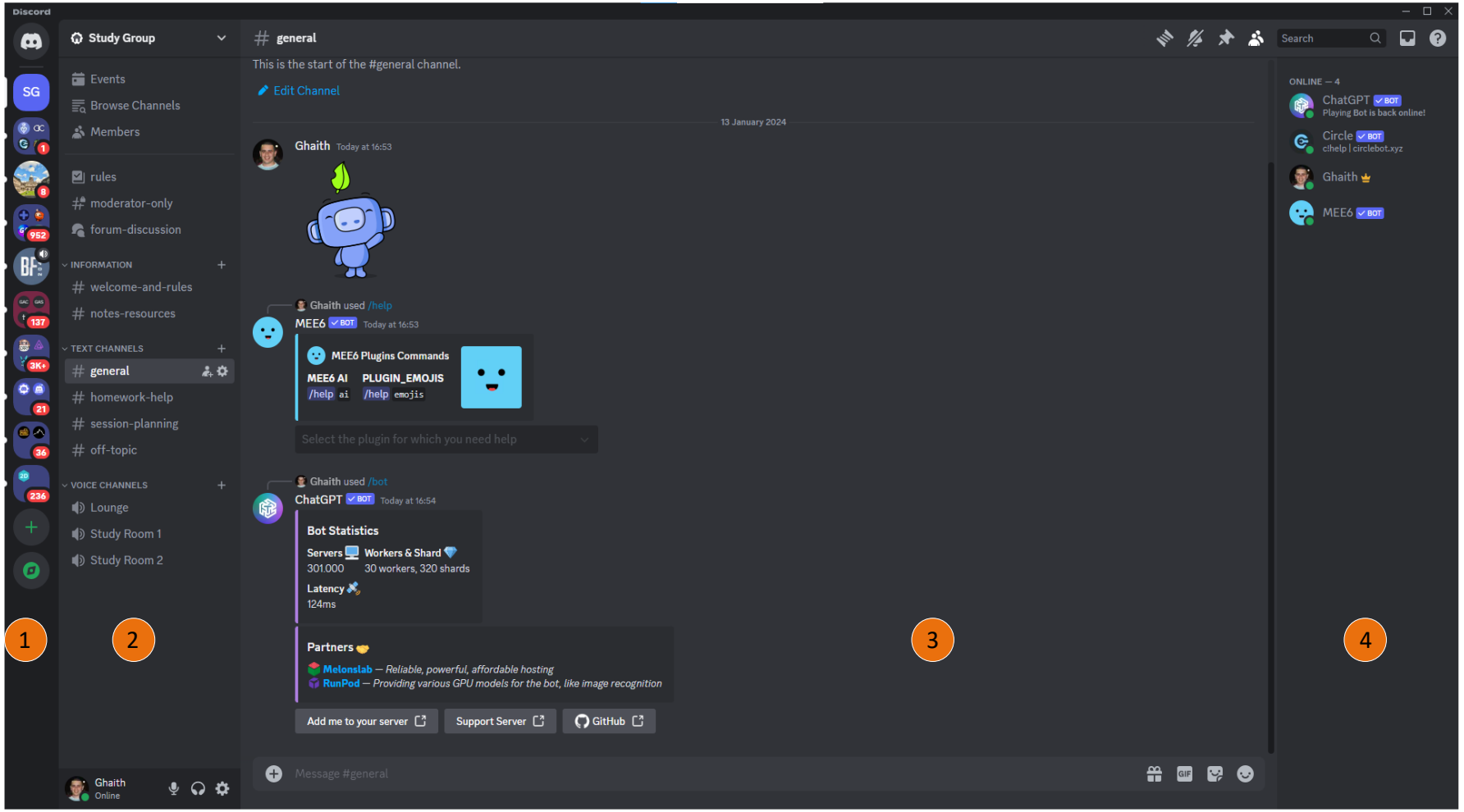


Figure 3.1. Discord's interface

The middle space (circle number 3) shows the content of the selected channel where the user can browse, send text messages or share media files. Channels within a Discord server are customisable, meaning that users can create as many channels as they need for different topics and they can lock and hide specific channels (e.g., the #moderator-only channel in the figure in circle 2, with the small padlock indicating that only the owner or moderators can access this channel). The right-hand column (circle number 4) shows a list of the Discord server's members and the applications (bots) used on that server. Members of Discord servers often have roles that represent their responsibilities, interests and positions in the community (e.g., community owner, moderator, admin, member, etc.). These roles are created by the server owner and assigned to the server members, and they indicate a structure where each role encompasses specific permissions and responsibilities within the server (e.g., the owner role can create channels, the admin role can ban members, etc.).

Discord was selected as the empirical case for this thesis for a number of reasons. First, according to Miles and Huberman's (1994) criteria where the phenomenon under study intensely manifests in the case, Discord represents an intense case. Discord combines many features from other platforms, such as Skype's voice and video calls, Twitter and WhatsApp's private messaging, Reddit's online communities, and Slack's communication channels. Thus, Discord is a rich amalgamation of varied technological features compared with other platforms, offering a rich context to study technology in which the manifestation of affordances and the patterns of technology use are intense.

Second, Discord is considered a revealing case (Yin, 2018) as it provides the opportunity to observe and analyse the complexity of contexts (both social and technological). Discord enables the investigation of social complexity since it is an open platform where diverse users from very different social contexts use it for varied purposes. For instance, Discord gathers together gamers in search of online communities who share similar interests, content creators seeking to engage with

their followers, software developers supporting product development work, and teachers using the platform to deliver online education. In many cases, these users engage with Discord as members of specific online communities, and the communities embed shared values, norms, identities and specific roles that determine how members within the community behave and interact. They can be part of multiple online communities and have different social roles and identities; hence, they are embedded in socially complex contexts that incubate multiple institutional logics. Discord is also considered a revealing case because it provides the possibility of examining technological complexity; it is regarded as a suitable platform that users often use in combination with other digital platforms to perform specific tasks and achieve particular goals. For example, software developers often integrate other software development platforms like GitHub to forward coding information into Discord and then use Discord as a space where they can collaborate on projects (Discord is therefore the place where they collaborate and communicate, and GitHub the place where they work on their tasks).

Finally, Discord is a unique case (Miles & Huberman, 1994) compared to other communication and social media platforms because the users' interactions with each other are driven by the users themselves instead of the platform's algorithms. For instance, Discord focuses on community building, giving users the autonomy to create and curate their communities, unlike Facebook, for example, where the platform drives users' interactions by focusing on algorithmic news feeds that influence the interactions between users, or Reddit's voting system, which affects the visibility of users' interactions. Discord also includes both personal and work communication but this is mostly at the individual level, unlike other platforms such as Slack, which is commonly used for work communication within an organisational setting. For instance, software developers may use Discord to work on development projects on one Discord server and to communicate with friends or family on another. Table 3.1 provides a comparison between Discord and other prominent communication and social media platforms.

Table 3.1. Comparison between Discord and other communication and social media platforms

Characteristics	Discord	Facebook	Reddit	Twitter (X)	Slack	WhatsApp
Unique features	Discord servers and bots	News feed, pages	Voting system	Tweets, retweets, and hashtags	Chat room channels	End-to-end encryption
Purpose	Communication and community building	Social networking	Discussion forums	Microblogging	Team collaboration	Instant messaging
Type of use	Group and community communication	Personal networking	Content sharing	Real-time information dissemination	Business and professional communication	Personal and group messaging, business communication
Source of monetisation	Nitro subscription (paid subscription service with extra features)	Advertisement	Advertising and premium membership	Advertising, premium membership	Subscription plans	WhatsApp business
Control over the order and visibility of content	Users	Algorithmic news feed	User vote, and algorithmic sorting	User followings and algorithmic timeline	Users	Users
Bot functionality	Auto-moderation, music playback and utility bots (integration with other services and APIs such as news or weather bots)	Chatbots and automated posts	Auto-moderation and auto-posting	Chatbots and automated posting of tweets, retweets and replies	Chatbots and productivity-focused bots (e.g., task management, collaboration bots)	Chatbots (limited to business uses)
Open API	Yes	Yes	Yes	Yes	Yes	Business users only

Characteristics	Discord	Facebook	Reddit	Twitter (X)	Slack	WhatsApp
The general aim of bots	Integrate with other services and APIs to extend Discord's feature set (e.g., moderation bots, music playback, utility bots)	Chatbots (mainly used in groups, pages and Facebook Messenger)	Chatbots and moderation bots	Chatbots and auto-posting tweets, retweets and replies	Chatbots and business-focused productivity bots (e.g., Jira and Trello collaboration bots)	Chatbots (for customer engagement and support)
App (bot) directory	Yes	No	No	No	Yes	No
News feed	No	Algorithmic news feed	Algorithmic popular feed and user-driven subreddits feed	Algorithmic popular feed and user-driven timeline	No	No

3.4 Data Collection

The empirical data for this research was collected from two sources: publicly available media articles on Discord (secondary data) and interviews with Discord users (primary data). At an early stage of the research, the netnography data collection technique was considered a potential source to triangulate the secondary and primary data. However, after spending all of July 2020 exploring various Discord communities, such as gaming communities, content creators and development communities (no data was collected or saved), netnography was ruled out as a research data collection technique in the context of Discord for a few reasons. Firstly, most interactions between community members were memes, GIFs, emojis and troll messaging, which do not indicate how they used Discord and cannot be used to discern different use patterns. Thus, a concern emerged about wasting time collecting data that were irrelevant to the research questions, which prompted the focus on interviews where potential interviewees are selected based on strict criteria. This allowed to directly talk to users and hear about their experiences instead of speculating on the meaning of their messages. Secondly, each Discord community has its own language and symbols that are widely shared among community members and are specific to that community, which requires considerable time to be spent learning and understanding each community's norms to avoid misinterpreting members' messages or actions. Finally, access to active and larger Discord communities would have been problematic with netnography, which requires observing members of communities and collecting their messages that might not be welcomed by large community owners and members. Even if access was granted, there was concern that community members might alter their regular interactions if they knew they were being observed, which might undermine the integrity of the research.

The following sections describe the data sources utilised in this research and explain the rationale behind using them.

3.4.1 Secondary data: published media articles on Discord

The data collection process began with collecting data from secondary sources such as official websites, blogs and media articles. Initially, four sources of secondary data were identified: Discord blog articles, the Medium publishing website, the official Discord community on Reddit, and the Quora website. The official Discord community on Reddit and Quora were ultimately dropped, however, with no data collected from either. The official Discord community on Reddit was dropped because the subreddit was mainly used to provide support to users on Reddit (answering questions from users encountering issues with Discord) and repost blogs that were already published on Medium and the blog website. The Quora platform, where people post questions and others answer them, was also dropped. The original intention of using Quora was to explore people's questions about using Discord, such as who uses Discord; can Discord be used for business; and what is the difference between Discord, Slack and Skype? Quora was dropped because answers to such questions were generic and did not reflect proficient users of Discord. Moreover, Quora has a monetisation program allowing users to make money by answering questions, which draws into question the credibility of the answers provided by users.

Consequently, secondary data was only collected from Discord blogs, because this is the official information published by Discord, and from Medium, because it includes articles written by people discussing their personal experiences of using Discord. The secondary data was collected as a reference point prior to the interviews and served to develop understanding of the context of the study, such as the nature of the platform, its evolution over time, and the different types of users and uses of Discord, which helps to gain a background understanding of the context of the platform, its features and users. Table 3.2 shows the collected secondary data and their contribution to this research.

Table 3.2. Secondary data sources

Source	Number of articles/blogs	Contribution to the study
Discord blogs	184	Gain an understanding of the platform's history, its main features and potential users
Medium	100	Identify different types of Discord users Identify potential interviewees Provide an overview of the users' social context (shared norms and values within Discord servers) Identify possible affordances of Discord Construct interview questions

3.4.1.1 Discord blogs

Discord blogs were collected in April 2020 and updated in August 2022. In total, 184 blog articles were collected and published between May 2015 and August 2022. The topic categories of these blogs are shown in Table 3.3 based on Discord's blog website. Discord blogs were helpful as they provided contextual background about the platform's history and development over time and built an overview of its features and potential affordances.

Table 3.3. Discord blog categories

Category	Focus	Number of articles collected
Community	Spotlights on community-related events	42
Discord HQ	General updates and news from Discord headquarters	23
Engineering and Design	Tutorials and resources for Discord app developers	28
How to Discord	Tips and guides for general Discord users	8
Policy and Safety	Publishing policy updates and transparency reports	24
Product and Features	Announcement of new features added to Discord	59

3.4.1.2 Medium articles

Medium is an online publishing platform that allows writers to share their knowledge and experiences through written blogs. Both amateur and professional writers can write blogs on Medium, sharing their experiences on a particular topic, and some communities and companies host their blogs on the platform. In terms of Medium articles related to Discord, the authors often write about what they use Discord for and the Discord features they like, and they compare Discord with other platforms such as Skype, Reddit, and TeamSpeak. Small companies and start-ups also post blogs about their rationale for moving to Discord from other platforms like Slack, which was helpful for understanding the context of Discord compared with other platforms. The Medium articles used were identified by searching the term "Discord". Due to the design of Medium's search results, which does not show the total number of results and relies on continuous scrolling to reveal them, the first 140 search results were examined. Of the 140 search results, 40 were excluded because they were irrelevant to the research; for example, articles about the "Discord" concept in linguistics and non-English articles were not included.

The diversity of Medium articles helped to identify various Discord users and how they use the platform; to exemplify some of the socially constructed norms and values within Discord; identify possible Discord features and affordances; assist in constructing the interview questions; and find potential interviewees for the research. Without this, identification would have been difficult, especially for those who are part of private communities including writing communities.

3.4.2 Primary data: interviews with Discord users

Semi-structured interviews with Discord users were the main data collected and analysed for this thesis. The interview method was chosen because it is able to collect participants' first-hand data about their use of Discord and elicit their ways of thinking when interacting with Discord. The semi-structured interview technique was applied to ensure flexibility in terms of following interesting themes that might

emerge from participants and asking follow-up questions relevant to the context of the conversation.

Since this thesis comprises two empirical studies, the interviews were conducted with a separate group for each study. The following two subsections discuss the interviews conducted for each empirical study.

3.4.2.1 First empirical study interviews

The focus of the first empirical study was on investigating diverse Discord users operating in different communities and exploring the nuances in their usage patterns. Before conducting the main interviews, three pilot interviews were carried out with six Discord users (two interviews were audio calls and one was text-based, conducted via Discord's direct messages) to assess the quality of the questions in the provisional interview guide. The pilot interviews assisted in refining the wording of the questions and revising their structure, adding additional questions relevant to the study, and obtaining feedback from interviewees about the clarity of the questions.

Interview participants were carefully selected based on three criteria to help identify informative interviewees. The first criterion was that the potential interviewee must be over 18 and an active user of Discord. The decision was made to select only users over 18 because Discord allows anyone over 13 to open an account on the platform; therefore, it was necessary to set parameters to avoid including minors in the research. The focus was also on active Discord users who use the platform daily to ensure they are familiar with Discord and its features and have relevant knowledge and experience. The second criterion was that potential participants must have a role or occupy a position within the communities on Discord. Instead of talking to causal users who might not offer in-depth information or do not have extensive experience with using Discord, the focus was on users who have a role within the community, such as gaming society committee members in university gaming servers, community owners, community managers, community moderators and admins, etc. Finally, potential interviewees had to be accessible, with their email addresses on their

websites, such as the Discord bot website, the organisation's official email address, and the content creator's email on social media. This criterion was implemented so it was possible to formally contact participants using the university email to ensure the emails were genuine and not casual scams, which are common on Discord.

In the early stage of the research and prior to collecting the interviews, the plan was to conduct interviews covering five different categories of Discord users who were identified from examining the secondary data, including gamers, software developers, content creators, writers and teachers. This decision was made to ensure the inclusivity of perspectives by representing the diverse social and cultural landscape. However, this was not attainable due to the difficulty of identifying and accessing potential interviewees for each category, as some Discord communities were private and impossible to identify (e.g., study and writing groups). Another factor that prevented equal diversity in each category was the notable number of potential interviewees who did not respond to the invitation emails to participate in the study. For instance, 102 potential participants were contacted via email after being identified as relevant using different sources, such as the National Student Esport (nse.gg) website (to identify university gaming societies), Discord bots listing websites (e.g., top.gg and discord.bots.gg) (to identify Discord bot developers), and Medium (to identify businesses, writers, teachers and others). However, only 18 replied to the emails and agreed to participate in the study, while an additional 2 participants were recommended by other interviewees, taking the total number of participants in this first study to 20. Table 3.4 shows the number of participants contacted and interviewed from different categories.

Table 3.4. The number of participants interviewed and their roles

Participant	**Category**	**Participant**	**Category**
P1	Content creator	P11	Discord bot developer
P2	Gaming society president	P12	Discord bot developer
P3	Content creator	P13	Discord bot developer

P4	Discord server moderator	P14	Discord bot developer
P5	Gaming society president	P15	Discord bot developer
P6	Gaming society admin	P16	Community manager
P7	Gaming society admin	P17	Discord bot developer
P8	Gaming society president	P18	Professional writer
P9	Discord bot developer	P19	Business owner
P10	Discord bot developer	P20	Esport organisation Product manager

The 20 interviews were all conducted online using Discord. Most of the participants preferred voice calls but three interviewees were open to video calls and one preferred a text interview because the participant felt more comfortable answering the interview questions through text chat. Some participants used screenshots and the screensharing functionality to showcase and explain the Discord features they used, which added to the richness of the interview data. Figure 3.2 provides an example of one participant's screenshot used when explaining the auto-moderation feature of the bot they developed. Participants were given identifying codes, such as P1, P2, P3, etc., to ensure their identities remained confidential. The interviews were carried out between November 2020 and April 2021 and lasted between 25 and 60 minutes. All the interviews were audio recorded (except the text interview as this was conducted over Discord's text chat), and transcriptions were produced for the analysis. Before conducting each interview, I sought to join the interviewee's Discord servers where possible so I was familiar with the community when the participants referred to them during the interview. For example, I observed how members interact within the communities and what types of events and activities were carried out in the community, and I identified some questions that arise while browsing these communities that could be relevant to the research to ask the interviewees about.

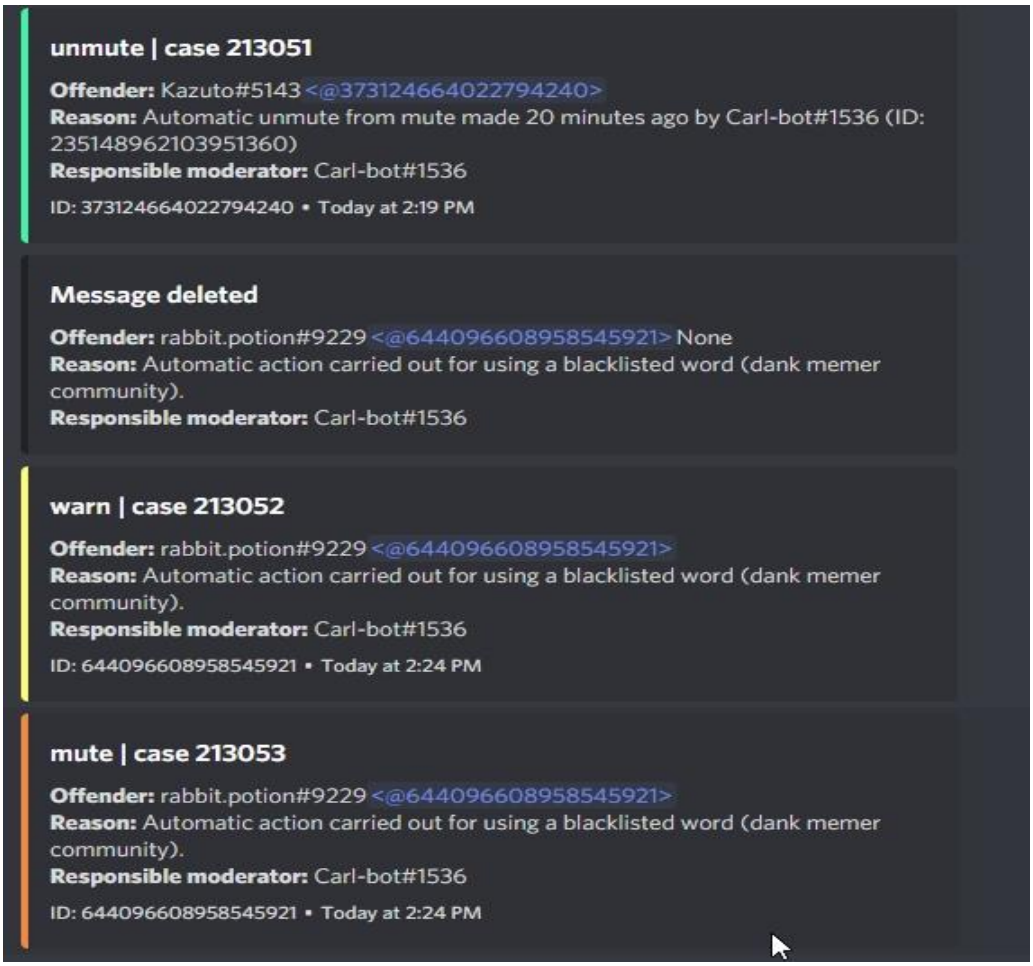


Figure 3.2. Example of screenshots provided by participants during the interviews

I developed an interview guide to assist in conducting the interview following Bryman's (2012) approach. The interview questions were constructed based on the theoretical lenses, such as asking about the participants' reasons for using Discord and the features they used, which was guided by the technology affordances lens to identify Discord affordances; and asking participants about the communities they were part of and, if possible, to compare them, which was guided by the institutional logics to capture the different norms, assumptions and values for each community.

The questions in the interview guide were formulated based on the background information gained from secondary data and the pilot interviews.

Since the interviewees were from diverse categories, a flexible interview guide was needed, and it was continuously revised and modified to account for differences between participants. In many cases, new questions were added relating to new issues raised in previous interviews, and some questions were asked of a particular group of participants because they were relevant. For example, software developers were asked about their reasons for developing their bots, which only applied to them. The interview guide was regularly revisited before each interview and revised after doing background research on the interviewees to learn more about them and contextualise the interview questions. Table 3.5 provides the interview guide questions.

Table 3.5. Interview guide for the first empirical study

Question	Follow up	Aim
Can you tell me more about yourself with respect to your involvement with Discord?	How did you first come to use Discord?	Discover how participants identify themselves
What do you usually do on Discord?	What do you usually do in these different communities?	Identify the different ways participants engage in various communities and identify potential institutional logics they follow
What is the main purpose of your Discord server?	What Discord features do you find useful?	Elicit participants' goals and link them with Discord features to identify Discord affordances
Do you think your use of Discord as a [moderator, developer, content creator, etc.] is different from a normal user?	How is that different?	Identify potential institutional logic multiplicity

The interviews began with introductory questions to allow the participants to introduce and identify themselves to contextualise their answers. These were followed by questions about their daily routine on Discord and the types of communities they engage with to identify potential differences that might be guided

by the institutional logics they draw from. The next set of questions entailed asking participants about the purpose of their Discord servers and what Discord features they found useful to identify potential Discord affordances. The last set of questions involved asking participants whether the way they use Discord as developers, admins, server managers, and content creators, is different from using it as a normal user to try to identify the potential multiple logics they follow. The questions were often asked in the order presented in Table 3.5. However, in some cases, participants raised new issues or topics that had not been considered, and thus, to maintain the flow of the conversation and avoid going back and forth between different topics, the order was not always followed.

3.4.2.2 Second empirical study interviews

The second empirical study sought to understand how and when people use Discord with other platforms. This second empirical study involved drawing on a different set of interviewees to answer the second research question. The collection of interviews for the second empirical chapter began in the fourth year of the program in November 2022. Considering the length of the PhD programme (four years) and the experience of difficulty of identifying participants for the first study, initially the choice was made to try to recruit participants for this second study by relying on a participant recruitment platform in order to speed up the data collection. Therefore, the Prolific platform was used to recruit potential interviewees to participate in the study. Prolific is an online research platform that enables researchers to recruit research participants by connecting them with a diverse pool of participants. Since Prolific is only designed to administer surveys and experiments, a screening survey was required to identify potential interviewees. Thus, an online screening survey was developed using Qualtrics. This survey was short, asking general questions such as how often participants use Discord, what they use it for, what other platforms they use alongside Discord, and whether they were willing to participate in paid online interviews. The survey questions were designed to filter participants who were active users of Discord and use Discord with other platforms so they could be invited to the

interview. The screening survey was administered to a sample of 100 individuals, and they were all paid £0.20 for completing the survey.

From the screening survey, 47 participants indicated their willingness to undertake the interview. The first six participants were contacted and interviewed to hear about their experience of using Discord with other platforms. The interviewees were compensated £15 for their time participating in the study. After conducting the six interviews, however, it was noted that these interviews lacked the necessary depth to address the research question. The participants recruited from Prolific were not sufficiently informative, and it became apparent that they did not have adequate knowledge or experience in using Discord. These interviews were later excluded from the study. Although the interviews were omitted, they did help refine the interview questions and update the interview guide used in the later stage.

After the process of recruiting interviewees from Prolific failed, efforts shifted to identifying interviewees who were likely to be informative and have the necessary experience to contribute to answering the research questions. As a result, Discord bot developers were identified as potential interviewees based on the interview experience in the first empirical study. This was done for three reasons. First, Discord bot developers are highly experienced with Discord, and they had provided in-depth detail on the topics discussed in the first study. Second, Discord bot developers rely on multiple services and platforms that they simultaneously use alongside Discord, which helped address the research question. Finally, Discord bot developers reflected a higher response rate to invitations to participate in the study; this was exemplified in the first empirical study, where the bot developer category had the highest response rate to invitations, indicating that developers were willing to share their knowledge and participate in the study.

Initially, the potential interviewees were identified with the help of the top.gg website, a third-party website that lists all Discord bots. During the early stage of the

data collection, Discord released its official directory app (late October 2022),[7] which lists all verified Discord bots within the application. After this, the process of identifying interviewees relied on Discord's app directory for three reasons: (1) all the bots listed in the app directory were verified by Discord; (2) the bots were organised into categories based on their purpose, such as entertainment, games, moderation and tools, social and utilities; (3) each bot listed in the app directory has a unique page that shows information about the bot, including the bot website and its support server, which were used to contact the bot developers. Identifying potential interviewees in Discord's app directory involved scanning all the bots listed in the directory's "All" category. The app directory has several pages of results and each page shows seven Discord bots sorted in descending order according to the size of the bots, which is measured by the number of Discord servers that have added the bot. To ensure the inclusion of varied bot sizes in the study, the first 25 pages were reviewed, and potential interviewees were contacted.

Contacting participants was done by browsing each bot page in the app directory to navigate the bot website and find the developer's email. In cases where the email was not found on the website, joining the Discord bot support server was the alternative approach to directly message the bot developer the invitation. Some developers were not contacted due to the lack of an email listed on the bot websites, if they explicitly mentioned in the support server that the developer should not be contacted, if the bot language was not English, or where the developers had been contacted or interviewed for the first empirical study. 100 developers were contacted and invited to the study, but only 21 responded to the invitation and were interviewed.

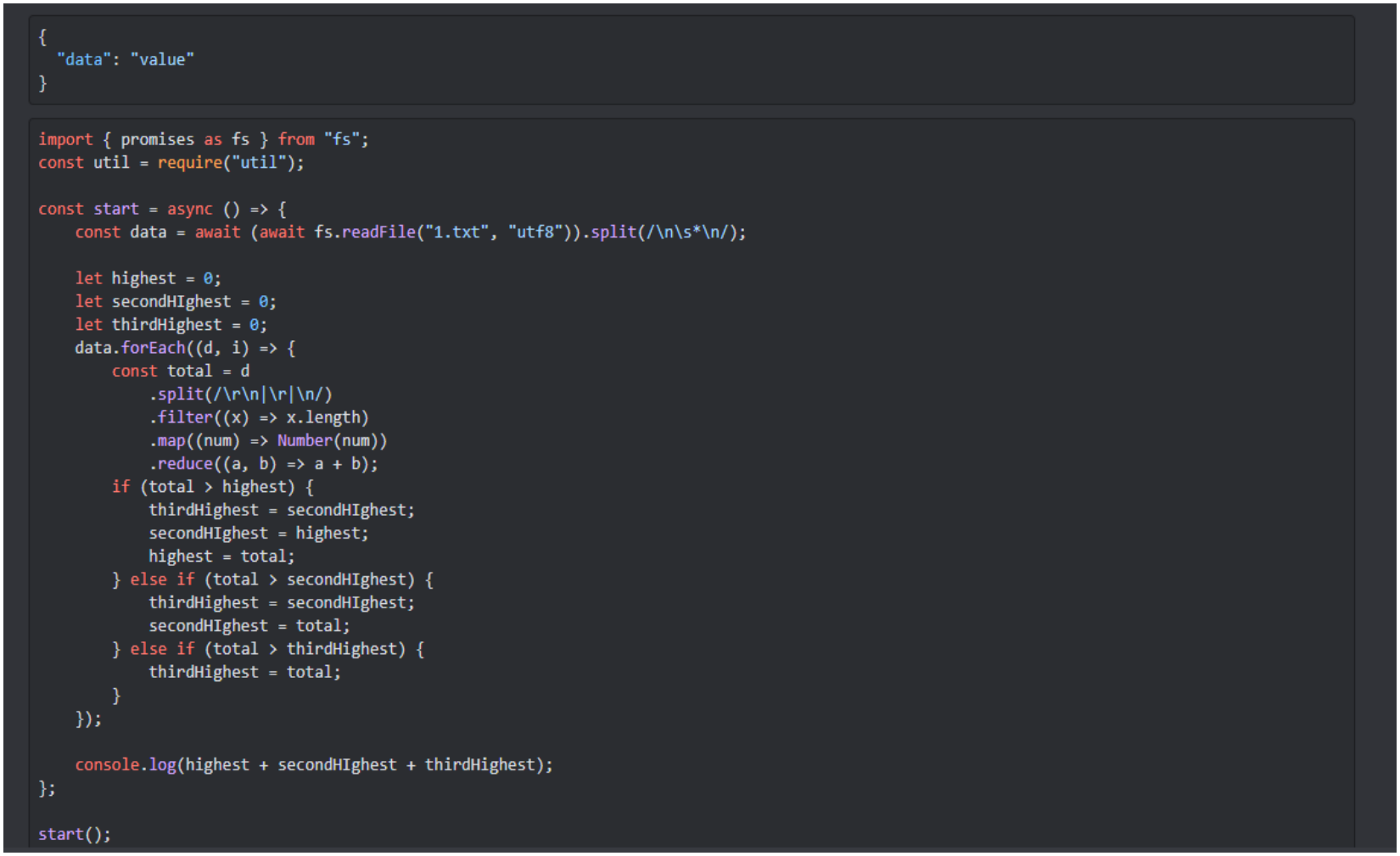
The interviews were conducted between November 2022 and May 2023. The interviews were all online using Discord, except for one conducted on cal.com (video conference platform). The interviews lasted between 30 and 65 minutes. All the

[7] https://discord.com/blog/app-directory-is-here-developers (accessed 15 December 2023)

interviews were audio recorded, and transcriptions were produced. Some participants used screenshots, text messaging, and screen sharing to elaborate on some ideas they mentioned in the interview. Figure 3.3 presents an example of a screenshot used by participants. All the participants were compensated with £15 for their time and the efforts they invested in participating in the study. Participants were given the identifying codes R1 to R21 to ensure their anonymity when reporting their quotes in this study. Table 3.6 presents the participants involved in the study and the type (bot category as listed on Discord) and size (numbers of Discord servers added the bot) of their Discord bots.

Table 3.6. Participants in the second empirical study and their Discord bot types and sizes

Participant	Discord Size	Bot Category	Participant	Discord Size	Bot Category
R1	11K	Moderation and tools, social	**R12**	288K	Social
R2	24K	Moderation and tools	**R13**	344K	Social
R3	24K	Moderation and tools	**R14**	294K	Moderation and tools
R4	47K	Entertainment	**R15**	398K	Utilities
R5	26K	Entertainment	**R16**	133K	Games
R6	18K	Social, moderation and tools	**R17**	133K	Social
R7	1.5K	Utilities	**R18**	400K	Games, social
R8	1.1M	Social, moderation and tools	**R19**	127K	Moderation and tools
R9	560K	Games, utilities, social	**R20**	103K	Moderation and tools
R10	430K	Moderation and tools	**R21**	95K	Moderation and tools
R11	436K	Games			



```
{
  "data": "value"
}
```

```
import { promises as fs } from "fs";
const util = require("util");

const start = async () => {
    const data = await (await fs.readFile("1.txt", "utf8")).split(/\n\s*\n/);

    let highest = 0;
    let secondHIghest = 0;
    let thirdHighest = 0;
    data.forEach((d, i) => {
        const total = d
            .split(/\r\n|\r|\n/)
            .filter((x) => x.length)
            .map((num) => Number(num))
            .reduce((a, b) => a + b);
        if (total > highest) {
            thirdHighest = secondHIghest;
            secondHIghest = highest;
            highest = total;
        } else if (total > secondHIghest) {
            thirdHighest = secondHIghest;
            secondHIghest = total;
        } else if (total > thirdHighest) {
            thirdHighest = total;
        }
    });

    console.log(highest + secondHIghest + thirdHighest);
};

start();
```

Figure 3.3. Example of a screenshot used by one participant to explain Discord's "syntax highlighting" feature

I developed a second interview guide for the second empirical study to inform the conduct of the interviews. The main discussion topics for the interviews were as follows. First, the interviews began by asking the participants questions about when they started programming and how they started using Discord, which provided the opening questions to the interview. Second, participants were asked questions related to their bots, such as the reasons for developing the bots and their main features, which was designed to learn more about their bots. The third topic focused on their use of Discord and involved asking participants questions such as what they use Discord for and, for each use, follow-up questions about the Discord features they found useful – to identify the affordances – and other platforms they used for similar purposes – to identify the different platforms they used – followed by asking about their reasons for using multiple platforms. The interview guide was flexible, with the interview questions continuously updated and refined throughout the data collection process. New questions were added whenever respondents introduced new insights. This approach allows the research to explore new topics that emerged as potentially relevant during early interviews in subsequent interviews. Additionally, where appropriate, follow-up questions were asked of respondents post-interviews to seek further explanations and elaborations on specific points and topics discussed in the initial interviews. The main interview questions from the interview guide are presented in Table 3.7.

Table 3.7. Interview guide for the second empirical study

Question	Follow up	Aim
Can you please tell me how you started programming?	How and when did you start using Discord	Background information about participants
How did you come up with the idea of the bot?	What are the main features of the bot?	Learn more about bots
What do you use Discord for?	What Discord features do you find useful for [use 1, use, 2, …]? How are these features useful for [use 1, use 2, ...]?	Identify participant's goals and Discord affordances

Question	Follow up	Aim
Have you experienced any downsides or limitations of Discord when using it for [use 1, use 2, ...]?	What did you do to overcome these limitations?	Identify possible platforms participants use alongside Discord
Do you use other platforms for [use 1, use 2, …]?	How do you use [platform A]? What features do you find useful in [platform A]? How are these features different from those in Discord? What makes you decide on which platform to use?	Identify other platforms participants used and their affordances, and elicit the reasons for using them

3.5 Data Analysis

The thematic data analysis approach was employed in this thesis to identify the themes and patterns that recurred across the interviews. Thematic analysis was used as it helps identify the different perspectives and interpretations of the phenomenon for further exploration (Saunders et al., 2019). NVivo data analysis software was used to code the interview transcripts and analyse the relationship between themes. The coding method adopted in the thesis was abductive coding, meaning that the coding process began by developing a provisional list of codes from the literature guided by the theoretical lenses, while allowing new codes to emerge inductively from the data (Saldaña, 2015). The following subsections explain the data analysis steps for the two empirical studies.

3.5.1 First empirical study data analysis

The first empirical study explores how diverse users operating in different social contexts use Discord. The analysis of the first empirical study involved three main steps:

1. Identifying Discord affordances that participants leveraged.

2. Identifying the institutional logics that participants followed.
3. Exploring the relationship between Discord affordances and institutional logics.

3.5.1.1 Identifying Discord affordances

Identifying the Discord affordances involved coding the interview data. The coding method followed Saldaña's (2015) coding cycles approach. Thus, the first cycle of the coding entailed applying the list of codes developed from the literature to the data and applying descriptive codes to the new codes that emerged from the data. The second cycle involved refining the first cycle codes and pattern coding to classify and categorise the codes and search for patterns.

The first cycle of the coding process began by preparing a provisional list of codes developed from the literature on social media affordances to identify possible affordances that may apply to Discord. Examples of these codes include "communication", "collaboration" (Karahanna et al., 2018), "visibility", "association", "editability" (Treem & Leonardi, 2013) and "self-presentation" (Mesgari & Faraj, 2012). This list was then applied to the data in the first coding cycle and descriptive coding (Saldaña, 2015) was used to allow new codes to emerge from the data. Applying the provisional list resulted in dropping some codes such as the "self-representation" and "editability" codes because there was no evidence of their presence in the data. The first coding cycle also allowed for new codes to emerge inductively, such as the "adding features" and "running event" codes.

The second coding cycle involved refining, reorganising and reanalysing the codes developed in the first cycle and employing pattern coding to identify common themes and patterns in the data. The coding process was iterative, involving going back and forth between the literature, codes and data. During the second coding cycle, some of the labels assigned to codes were changed to have more accurate labels that reflect the content of each. For instance, the "adding features" affordance code was

labelled to contain inferences where participants reported that Discord enabled them to add new features not previously found on Discord. This code was later changed to the "innovation" affordance code as all inferences referred to introducing novel features to Discord. After a few iterations of exploring the content of the code, the label was again changed to the "developing" affordance code since all the inferences mentioned referred to the development of Discord bots to add these novel features. Some codes were also merged as they refer to similar ideas. For example, the "notification" code was used to describe the automated alerts sent to users on Discord, which was then merged with the "visibility" code because sending or receiving notifications denotes the visibility of users' actions.

Pattern coding was also employed in the second coding cycle to develop categories to group the codes developed in the first cycle and identify potential themes in the data. Pattern coding involves categorising several codes reflecting different ideas on the same topic (Saldaña, 2015). For example, the "collaborating" and "communicating" codes refer to different forms of interaction: general interaction (i.e., communicating) and specific interaction when working with other people to achieve a common goal (i.e., collaborating). Therefore, the abstract code "interacting" was used to subsume these two forms of interaction. Similarly, the "developing" code encompassed inferences about different types of bots that serve different purposes, such as automation, organisation and entertainment. Thus, the "developing-automation", "developing-organisation" and "developing-entertainment" subcodes were constructed and subsumed under the "developing" code. To ensure that there was no overlap between the identified affordances, tables were created to match all the affordances identified in each interview with the participants' goals and the Discord features they utilised.

After several iterations of pattern coding and examining the content of the affordances codes as well as the tables that were created to distinguish the identified affordances, it became clear that these affordances could be further grouped into four main themes that represent the types of affordances: the core affordances

representing Discord's main affordance; the assistive core affordance representing the affordances that enforce the core affordances; the innovative affordance representing the affordance that enables adding novel features; and assistive innovating affordance representing the affordances that support the innovative affordance. Figure 3.4 illustrates the development of the codes.

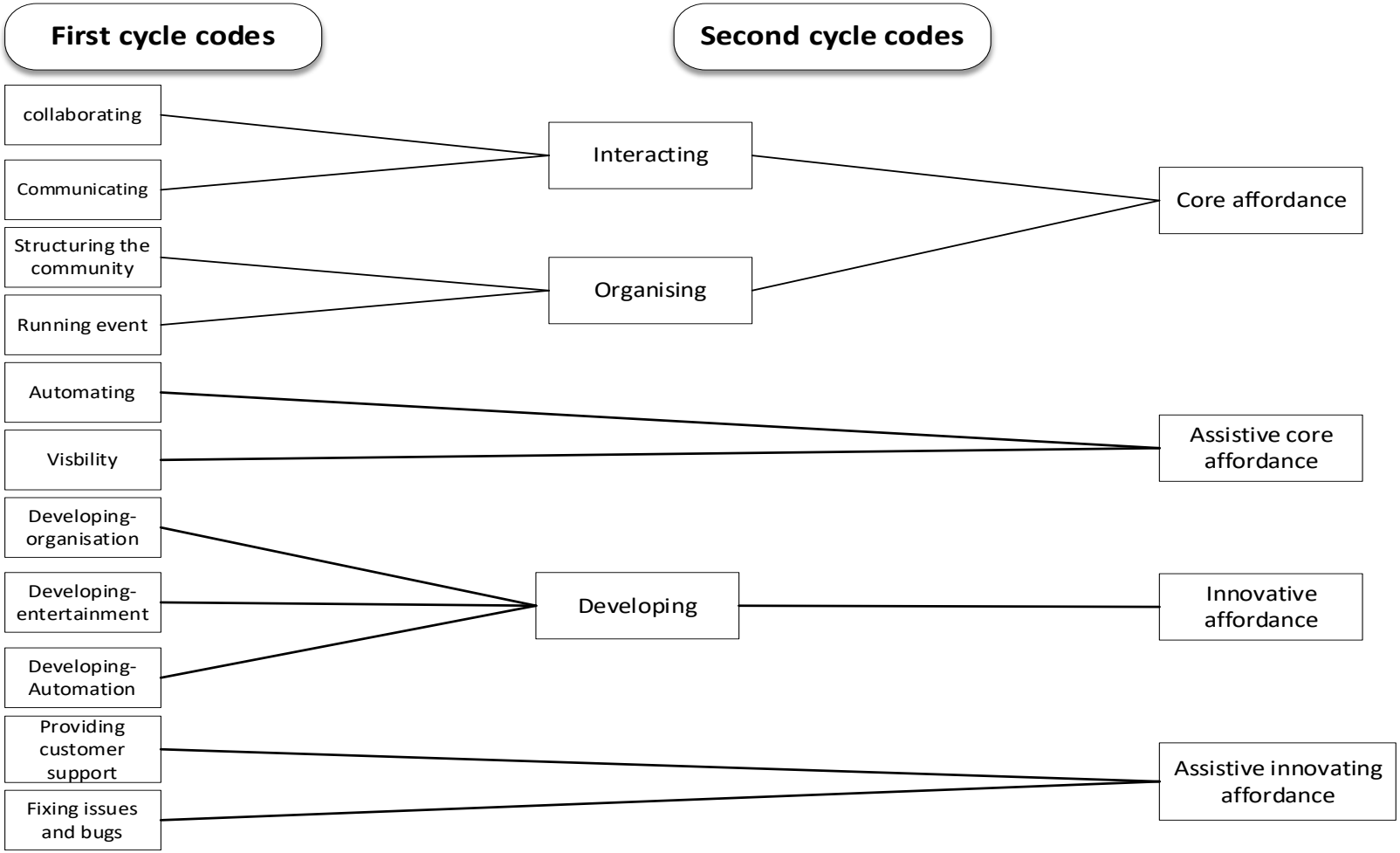


Figure 3.4. Development of the codes to identify Discord affordances

3.5.1.2 Identifying institutional logics

The same two-cycle coding process (Saldaña, 2015) used to identify Discord affordances was also applied to code for institutional logics. The first cycle of coding involved coding any evidence mentioned by participants that indicated the presence of institutional logics, resulting in creating four main codes: “community logic”, “professional logic”, “entrepreneurial logic” and “corporate logic”. The second coding cycle entailed revisiting the institutional logic literature to explore how existing research identifies the logics to refine the logic codes identified in the first cycle. In the literature, the institutional logics are identified by highlighting their components. Thus, the second coding cycle refined the logic codes by creating new subcodes for the main logics codes, such as “principles”, “assumptions”, “sources of legitimacy”, and “source of authority”, to differentiate the different components of institutional logics. The second coding cycle also involved dropping the “corporate logic” code due to the lack of recurring evidence of its presence (identified in one interview only). However, one concern that emerged was that identifying institutional logics through coding was not sufficiently rigorous as it was evident that some of the interview data could be coded into different components and there was overlap between some of these components, such as the principles and assumptions. Therefore, this coding was combined with a second approach to identify institutional logics, to ensure a consistent and rigorous approach to identifying logic and eliminate any chances of overlap between logic components.

This second approach to identifying institutional logics in this research included developing “institutional logic profiles” based on coding the data for specific components of institutional logics identified in the literature. These profiles were tables developed for each interview that placed the institutional logic components on the y-axis of the table and the components' characterisation and representative quotes from the interview data on the x-axis. The process of identifying the institutional logic profiles entailed thoroughly examining the institutional logic literature to identify possible logics components that could be applied to the data.

Examples of these components include principles, assumptions, domain (Berente & Yoo, 2012), sources of legitimacy, authority and identity (Thornton et al., 2012). By applying these components to the data, only four components were noted to have relevance in the context of the study as there was evidence for their existence in the data. These components were:

1. Principles that define the goals and values associated with the institutional logics (Berente & Yoo, 2012).
2. Source of legitimacy, which refers to the basis on which actors are perceived as trustworthy and acceptable by others who subscribe to the institutional logic (Almandoz et al., 2017).
3. Source of identity, which refers to the role and social identities mentioned by actors in association with the institutional logic (Hansen & Baroody, 2020).
4. Focus of attention, which defines the actions and practices associated with the logic that actors attend to and perform when drawing from the logic (Georgiou & Arenas, 2023).

Table 3.8 presents an example of the institutional logic profile developed for P8 (who showed evidence of the community logic only).

Table 3.8 Example of the institutional logic profile developed for P8

Community Logic		
Component	**Characterisation**	**Representative quote**
Principles	Creating and maintaining a boundary	"So, it [Discord] is a way of bringing our players and building up our community in a place that can be seen by other people. Discord to us is like our little bubble that we stay in."
Source of legitimacy	Adherence to community norms	"We do not really have any complaints about people being rude, or aggressive, or kind of calling people out, or getting in arguments in the chats anymore because we have got very strict rules in place to manage that and the people who do get reported are usually very apologetic."

Community Logic		
Component	**Characterisation**	**Representative quote**
Source of identity	Position in the community (role identity)	"Because as president, I have got the most permissions out of everyone, so I was managing it all because I was on the committee last year as well."
	Sense of belonging (social identity)	"I think that is something really important for these communities because they are essentially what it would be like to have a friendship group like on the internet, and it gives that feeling of you are in a place where everyone kind of gets it, and I really liked that about Discord and how I got into it and finding my feeling, because I was like really dubious about Discord, to begin with."
Focus of attention	Engagement and interaction	"We really tried to implement a system in which everyone felt that they would be welcome to join and play a variety of games, and so we would do like free games, and we do paid games which we knew a lot of people were playing or were interested in, and then we started to implement extra things."

These institutional logics profiles were developed using Google Sheets while simultaneously coding the logics components identified on NVivo. The development of the institutional logic profiles led to the identification of three logics: community, professional and entrepreneurial. The process of associating an institutional logic with a particular participant was based on the evidence found for each logic's components in the interview. Evidence for two or more components of a particular logic was considered robust enough to associate that logic with the participant. Figure 3.5 shows the table used to identify the evidence of each logic for all the participants. For example, in Figure 3.5, P6 showed evidence for 3 components of the community logic and evidence for one of the entrepreneurial logic components, then P6 was said to be drawing from the community logic only because there was insufficient evidence of the presence of the entrepreneurial logic.

		Community Logic					Professional Logic					Entrepreneurial Logic				
	Logic Combination	Princriples	Legitimacy	Identity	Attnetion	Total	Princriples	Legitimacy	Identity	Attnetion	Total	Princriples	Legitimacy	Identity	Attnetion	Total
P1	C+P+E	☑	☐	☐	☑	2	☑	☑	☑	☑	4	☐	☑	☐	☑	2
P2	C	☑	☐	☑	☑	3	☐	☐	☐	☐	0	☐	☐	☐	☐	0
P3	C+P+E	☑	☑	☑	☑	4	☑	☑	☑	☑	4	☑	☑	☐	☑	3
P4	C	☑	☐	☑	☑	3	☐	☐	☑	☐	1	☐	☐	☐	☐	0
P5	C+P+E	☑	☐	☑	☑	3	☐	☐	☑	☑	2	☑	☑	☐	☑	3
P6	C	☑	☐	☑	☑	3	☐	☐	☐	☐	0	☑	☐	☐	☐	1
P7	C	☑	☐	☐	☑	2	☐	☐	☐	☐	0	☐	☐	☐	☐	0
P8	C	☑	☑	☑	☑	4	☐	☐	☐	☐	0	☐	☐	☐	☐	0
P9	C+P+E	☑	☐	☐	☑	2	☑	☐	☑	☑	3	☑	☐	☑	☑	3
P10	C+P	☑	☐	☑	☑	3	☐	☐	☑	☑	2	☐	☐	☐	☐	0
P11	C+P+E	☑	☑	☑	☑	4	☐	☑	☐	☑	2	☑	☑	☐	☑	3
P12	C+P+E	☐	☐	☑	☑	2	☑	☑	☐	☑	3	☑	☑	☐	☑	3
P13	C+P+E	☐	☐	☑	☑	2	☑	☐	☑	☑	3	☑	☑	☐	☑	3
P14	C+P+E	☐	☑	☑	☑	3	☑	☐	☑	☑	3	☑	☑	☐	☑	3
P15	C+P	☐	☐	☑	☑	2	☑	☐	☐	☑	2	☐	☐	☐	☑	1
P16	C+P+E	☑	☑	☑	☑	4	☑	☑	☑	☑	4	☑	☑	☑	☐	3
P17	C+P+E	☐	☑	☑	☑	3	☑	☑	☑	☑	4	☑	☐	☐	☑	2
P18	C+P	☑	☐	☑	☐	2	☐	☑	☑	☑	3	☐	☐	☐	☐	0
P19	C+P+E	☑	☐	☑	☑	3	☐	☑	☑	☑	3	☑	☑	☐	☑	3
P20	C+P	☑	☑	☐	☑	3	☐	☐	☑	☑	2	☐	☐	☐	☐	0

Figure 3.5. The table used in the analysis to identify the evidence of logics components for each participant

After identifying these logics, three NVivo cases – “community logic”, “professional logic” and “entrepreneurial logic” – were created to prepare for the next step of the analysis (exploring the relationship between Discord affordances and institutional logics using NVivo). Then, the interview files that showed evidence of each logic's presence were coded into the relevant logic case. For example, if one interview evidenced the community and professional logic, the whole interview was coded into the community and professional logic cases.

3.5.1.3 Exploring the relationship between Discord affordances and institutional logics

After identifying Discord’s affordances and institutional logics, the last step of the analysis was to explore the relationship between them. This step followed Miles et al.’s (2014) approach to developing matrices to identify possible patterns in the data. NVivo matrix coding queries were used to develop these matrices and examine the relationship between the affordances codes identified in the first step of the analysis and the institutional logics cases identified in the second step. These queries sought to identify potential patterns by exploring the affordances leveraged by participants who exhibited the community, professional or institutional logics. However, this step did not reveal any patterns as all affordances were leveraged by participants under each logic.

The next step focused on identifying possible patterns between the affordances leveraged by participants who drew from single and multiple institutional logics. Participants drawing from multiple logics were identified from the table presented in Figure 3.5 (highlighted in green), where the participants drew from two or more logics (i.e., two or more components of each logic appeared in their logic profiles). This analysis revealed that innovative and assistive innovating affordances were only leveraged by participants who drew from multiple logics. Participants who operated under multiple logics drew from a combination of community and professional logics or a combination of all logics (i.e., community, professional and entrepreneurial) (see

Figure 3.5; logic combination column). Thus, NVivo was used to conduct further coding queries between affordances and these logic combinations to explain why innovative and assistive innovating affordances were associated with multiple logics. However, the coding query revealed no significant differences between the affordances and the logics combinations (see Appendix 2). As a result, the analysis involved iterations back to the literature on institutional complexity to explain these findings. In this renewed review of the institutional literature, several studies were found that point out the prospect of analysing the relationship between multiple logics and their influence on behaviours (Besharov & Smith, 2014; Raynard, 2016; Vermeulen et al., 2016). Accordingly, the data was examined again to check for any relationships between the multiple logics identified in this study.

Following a thorough examination of the data, it became apparent that there were relationships between multiple logics as participants drew from these logics separately in different Discord servers or together in the same Discord server. Thus, the multiple logics coexist in configurations that influence participants' behaviours. Two dimensions emerged from the data that differentiate between the logics configurations:

1. The social space that participants draw from multiple institutional logics. Discord servers represent such social spaces where participants engage and interact with diverse audiences across different servers.
2. The timeframe that indicates whether participants draw from multiple logics separately at different times or simultaneously at the same time.

To coherently identify multiple logics configurations, all the interviews were examined by looking at the Discord servers that participants mentioned and identifying the institutional logic they draw from inside these servers. These Discord servers were treated as distinct social spaces where each server represents a boundary around a particular interest. Based on this examination, two configurations of multiple logics emerged: separated and supportive. The participants who exhibited

a separated logic configuration were identified as they drew from one logic in separate Discord servers at different times, for example, drawing from the community logic in the friend's server and drawing from the professional logic in Discord's bots support servers. On the other hand, the participants who exhibited the supportive configuration were identified when they simultaneously drew on multiple logics in one Discord server at least, for instance, drawing from the community logic to host social events and drawing from the professional logic to provide customer support in the same support server. After identifying these logic configurations, a coding query was conducted to explore potential patterns between Discord affordances and the multiple logics configurations.

3.5.2 Second empirical study data analysis

The second empirical study explored how and when participants used multiple platforms alongside Discord. The analysis involved three steps:

1. Identifying the multiple platforms used with Discord.
2. Identifying the types of multiple technology use (how participants used multiple platforms).
3. Identifying the mechanism by which participants used one platform over another and the factors influencing their decisions.

3.5.2.1 Identifying multiple platforms

The first step of the analysis involved coding the instances where various platforms were used by participants alongside Discord. Descriptive codes (Saldaña, 2015), such as "Discord & Facebook", "Discord & Stack Overflow", "Discord & WhatsApp", and "Discord & Slack", were used to include the instances where participants used these platforms with Discord to achieve their goals. These codes were subsumed under a parent code called "multiple technologies". This step also coded for the comparisons participants made when discussing their use of multiple platforms. Participants in the interviews often compared Discord and other platforms by highlighting either the

pros or cons of each platform. Thus, a new code called “comparison between Discord and other technologies” was created to include the instances when participants highlighted the advantages and limitations of the platforms they mentioned. Some participants, for instance, highlighted the difficulty of joining Slack servers compared to Discord; hence, the “comparisons between Discord and other technologies” code contained a subcode called “Slack” and within the “Slack” subcode there was another subcode called “difficult to join Slack servers”.

3.5.2.2 Identifying the types of multiple technology use

The analysis then identified the ways these multiple platforms were used. This involved thoroughly examining the instances coded in the “multiple technologies” code. During this thorough examination, it emerged from the data that there were instances where participants either used multiple platforms simultaneously or they transitioned between multiple platforms to achieve their goals. Therefore, two new codes were devised called “multiple substitution” to include the instances where participants moved between multiple platforms and “multiple complementary” to include the instances where participants used multiple platforms simultaneously to complement each other.

Examining the multiple technologies code also involved identifying participants’ goals when using multiple platforms. For example, in the interviews, participants were asked how they used Discord, and they were then asked if they used other platforms for the same purposes. This helped identify how participants relied on multiple platforms to achieve these goals. The analysis revealed that participants' goals were broken down into multiple levels. Participants leveraged similar affordances from multiple platforms to undertake similar tasks, while they leveraged different affordances from multiple platforms to undertake different tasks. To clearly distinguish between the substitutional and commentary uses, each subcode of the multiple substitutional and multiple complementary codes was examined by creating tables in Excel containing users’ goals and tasks; the multiple platforms used with

Discord; the features and affordances of Discord and other platforms; and the evidence from the interview data. Table 3.9 presents an example of the table created for the code “Discord and Teams”. After creating these tables, new NVivo codes were created for users’ goals and affordances, which were used to conduct a matrix coding query to explore the relationship between participants' goals and the types of multiple platforms.

Table 3.9. Example of the tables developed to examine multiple platforms used by participants

Goal	platforms	Discord	Other platform	Quote
Communicate with other people	Discord & Teams (substitutional use)	Task: Talk to friends Affordance: interacting	Task: Meeting with other people Affordance: Interacting	“I only use those [Teams and Zoom] if I am meeting with someone who does not have Discord and needs to communicate for these other mechanisms. So, I have Microsoft Teams and Zoom both installed on my computer, but I only use them if I am interacting with people who exclusively use Teams or Zoom.” [R6]

3.5.2.3 Identifying the mechanism for using one platform and the factors influencing participants’ decisions

The analysis of the instances of “multiple substitutional”, “multiple complementary” and “comparisons between Discord and other technologies” codes revealed that participants tended to leverage one platform affordance over another. This results from engaging in evaluative processes and constant comparisons between the affordances of Discord and other platforms. Based on the literature review, affordance potency (Anderson & Robey, 2017) was identified as a potential concept to explain this evaluative process. The affordance potency concept describes the strength of the relationship between users’ abilities, technology features and the context of use (Anderson & Robey, 2017). The strength of this relationship is

conditioned by the ease of actualising the technology affordances. However, applying the affordance potency concept to the data was found to be inadequate to explain the evaluative criteria demonstrated by participants in this study beyond the ease of actualising the affordance. The analysis showed that participants evaluated the affordances based on their effectiveness, the promptness of achieving goals and the awareness of the technology affordance. Consequently, the affordance potency concept was dropped as a potential concept to explain the data.

A new concept – which I called affordance propensity – also emerged as a viable construct to explain participants' tendency to leverage technology affordances. "Propensity" is defined as the inclination or tendency to do something.[8] Thus, "affordance propensity" refers to the likelihood of leveraging one technology affordance to carry out a particular task. The analysis then examined the instances coded in the "multiple substitutional" and "multiple complementary" codes to identify the dimensions of affordance propensity. The results of the initial coding were four codes that represent the affordance propensity dimensions: "effectiveness", "convenience", "promptness" and "visibility". Effectiveness included the instances where participants leveraged the technology affordance that best suited their goals; convenience involved the instances where participants leveraged the affordance that made it easier to achieve their goals; promptness included the instances where participants leveraged the affordance that allowed them to quickly achieve their goals; and visibility included the instances where participants leveraged the technology affordance that was most popular.

After several refinements of the affordance propensity dimensions codes, the convenience code was merged with "accessibility" as its instances indicate that participants leveraged the affordances that were most accessible to them. Similarly, the visibility code was changed to "awareness" because its content indicates a

[8] *Oxford English Dictionary*, s.v. "propensity (n.), sense 1.b", https://doi.org/10.1093/OED/2168823335 (Accessed 12 December 2023)

cognitive process as the affordance is taken for granted. Despite these refinements of the affordance propensity codes, it was still difficult to precisely distinguish the instances coded for all codes as there was overlap between them. For example, an affordance that makes it faster for users to achieve their goals or makes them easier to actualise can also be considered effective. Iterations back to the literature served to illustrate that the legitimacy framework (Suchman, 1995) was a suitable way to conceptually differentiate between these dimensions; in particular, the pragmatic, normative and cognitive evaluations of the legitimacy of organisational actions were found to be relevant to the data on dimensions of affordance propensity. These evaluations were then applied to the data and resulted in three codes that defined the affordance propensity dimensions: "relative effectiveness", "relative normativity" and "relative recognition". These codes were coded as relative as they involved the evaluation of multiple affordances against each other.

In the process of coding for the affordance propensity dimensions, the data revealed that there were contextual factors that influenced the relativity of these dimensions. The affordance actualisation literature was reviewed to identify possible factors, and it was found that users' abilities, technology features, and the environment are potential factors that influence the actualisation of an affordance (Strong et al., 2014; Anderson & Robey, 2017). The analysis then coded for the contextual factors that influence the affordance propensity dimensions. This analysis resulted in creating three codes representing the contextual factors: "relevant social groups", "the capabilities of the platform" and "task characteristics".

The final step of the analysis involved conducting matrix coding queries on NVivo between the affordance propensity dimensions codes and the multiple substitutional and complementary codes to find out what dimensions explain each type of multiple platforms use. Similarly, the matrix query was performed between the contextual factors and the propensity dimensions codes to identify what factors influence the propensity dimensions.

3.6 Research Ethics

Conducting research involving human participants necessitates taking note of ethical considerations when carrying out the study (Saldaña, 2015; Myers, 2020). Such considerations involve preventing harm to participants, and ensuring privacy, confidentiality, anonymity and voluntary participation (Bryman, 2012). Since this research aimed to understand the use of technology, the risks associated with the research were minimal because no sensitive information was collected and participants were only involved in the research because they were interested in sharing their experiences and perspectives. Conducting this research necessitated obtaining ethical approval from the university ethics committee. Therefore, the ethical approval application was submitted and approved by the Business School Ethics Committee at the University of Edinburgh before data collection commenced.

This research complied with the University of Edinburgh Business School Research Ethics Policy's guidelines for the ethical conduct of the research. The guidelines include:

1. **Respect for free and informed consent**: Participants were free to take part in the study without manipulation or coercion. They were also given the freedom to withdraw from the study at any stage without giving a reason.
2. **Respect for privacy, anonymity and confidentiality**: All participants were guaranteed that their names or Discord tags would not be disclosed and other identifiable information would be confidential and kept within the research team. The collection of personal information was kept as minimal as possible, and other personal information was not asked for unless the participant voluntarily disclosed it in the interview. Participants' names, Discord tags and associated bots' names were anonymised; participants in the first study were given the codes P1-P20, while those who participated in the second study were given the codes R1-R21. These codes are used when including direct quotes from the participants in this research.

Participant information sheets and consent forms were developed as part of the ethical approval process (copies of the participant information sheet and consent form are included in Appendix 1). The participant information sheet included information about the aim of the study, how participants were identified and why they were selected, the participant's rights in the study and what was expected of them, noting voluntary participation in the study and the freedom to withdraw at a later stage without any consequences, as well as how the participant's data would be accessed, stored and anonymised. The consent form contained agreement from the participants to be interviewed; they agreed to the audio recording of the interview and made an explicit statement that they had read the participant information sheet. Potential participants were sent invitation emails (or direct messages on Discord in the second study) asking them to participate in the study. The participant information sheet was attached to the email (or the direct message) with more information about the research and the participant's rights. Participants who responded to the invitation emails agreeing to participate in the study were later sent a consent form to sign before the interview. Participants were also given a choice of any communication platform they preferred to do the interview on; most of them chose Discord and shared their Discord tags to be added as friends on Discord so the interviews could be conducted.

Compensating participants in the second study led to ethical concerns. The ethical approval was amended and approved by the University of Edinburgh Business School ethics committee in July 2023 before collecting the data. Participants in the second study were paid £15. The primary aim of paying participants was to compensate them for their time and efforts and encourage participation to speed up the data collection process. While there are no specific guidelines on the acceptable amount that should be paid to participants as it depends on the context of the research, Head (2009) reports on several studies that paid £10, £12 and £20. The £15 paid to participants in this research was thus considered a fair amount that would not compromise the voluntariness of participation in this study as voluntary participation was emphasised

in the consent form; these participants could still withdraw from the research at any time. Participants were offered payment through PayPal or in vouchers to avoid collecting sensitive data such as bank account details. All the participants were paid using PayPal or they sent donation links that they used to fund their bots.

3.7 Conclusion

This chapter describes the research method and design adopted. The thesis adopted an interpretive research approach because this fits the research aim of understanding technology use in its context by gaining first-hand perspectives from Discord users. It also adopted a single case study research design using Discord. Discord is a communication and social media platform that enables users to communicate and build their online communities. Discord was used because it combines many features from other platforms, offering a rich context to study technology where the manifestation of affordances and usage patterns are intense. It is also a unique case that enables examination of the social and technological complexity where Discord is an open platform gathering diverse users from different social contexts, as well as Discord being used in combination with other platforms to achieve users' goals.

Data was collected from publicly available media articles (secondary data) and semi-structured interviews with Discord users (primary data). In the first and the second empirical studies 20 and 21 interviews were conducted respectively with two different groups of participants. Thematic analysis was adopted to reveal any possible themes and patterns among the interview data that explain the patterns of Discord use. An abductive approach to coding was used by relying on initial codes developed from the literature and allowing new codes to emerge from the data. This chapter discussed the three data analysis steps followed in both empirical studies, as well as delineating the ethical concerns that were taken into consideration when conducting the research. The thesis complied with the guidelines of the University of Edinburgh Business School research ethics policy.

4 Chapter 4: Social Complexity and Technology Use

4.1 Introduction

This chapter presents the empirical findings of the research to answer the first research question of the thesis: how does social complexity arising from the multiple users' goals, values, norms and interests shape users' patterns of technology use? To examine this research question, the research utilised an integrative theoretical framework that combined the technology affordances lens (to examine the patterns of use) and the institutional logics perspective (to examine social complexity). The framework served to examine the relationships between the technological affordances of Discord and the institutional logics that characterise the social contexts within which users operate. The framework was applied to analyse data from 20 interviews with different categories of Discord users operating in various social contexts; the focus was on examining their patterns of Discord use (see Methodology chapter, section 3.4.2.1).

This chapter is divided into three sections corresponding to the three steps involved in the analysis. The first section examines the Discord affordances that participants leveraged to achieve their goals, and it develops a typology of Discord affordances, which provides an overview of how participants use Discord to achieve their goals. The second section identifies the types of institutional logics captured in the data. These logics reflect the differences in Discord participants' goals, norms and values, which inform their actions as they leverage the varied Discord affordances. The final section examines the relationship between Discord affordances and institutional logics by first presenting the relationship between individual Discord affordances and institutional logic separately. Next, the section explores the relationship between Discord affordances and single or multiple (reflecting simple versus complex social contexts), and then within multiple institutional logics it investigates the relationship between specific configurations of institutional logics (separated or supportive).

4.2 Discord Affordances

The first step of the analysis involved identifying Discord affordances that participants leveraged to achieve their goals. As discussed in Chapter 2, technology affordances arise from the interaction between users and technologies based on attending to users' goals and technology features (Leonardi, 2011). Therefore, the first step in identifying Discord affordances involves clarifying its key features.

Discord is a communication platform with an extensive array of features that help users communicate and build online communities (see the Methodology chapter, section 3.3). Table 4.1 presents the key features that participants leverage while using Discord, which give rise to Discord affordances.

Table 4.1. Discord's key features

Feature	Description
Text Channels	The space where users can send text-based messages, share media files and reply to messages.
Voice Channels	The space where users can talk to each other through voice.
Video Calls	Users can talk and see each other through video in real time. Video calls take place within the voice channels or through direct messages.
Screen Sharing	Users can view what is happening on each other's screens. Screen sharing is also hosted through voice channels.
Activity Status	Display what users are doing and show it under their names (e.g., playing a game or using specific applications).
Roles	Categories that classify server members into groups that determine their appearance and privileges. Roles are often represented by a hierarchy where higher roles (e.g., community owner) have more privileges and control over the server than lower roles (e.g., community member).

Feature	Description
Permissions	Privileges that determine what actions and activities users can do within the server or a particular channel.
Discord Bots	Applications developed by Discord users on Discord that perform certain tasks.
Server Insights	Show statistics about the server activities and engagement, such as the number of people who joined or left the server.
Mentions	Tagging specific usernames to get their attention by triggering a notification for them.

Discord affordances are identified by matching these Discord features with specific participants' goals (see Table 4.2 in the next section), which emerged during the interviews (see the Methodology chapter, section 3.5.1.1). This matching process identified seven Discord affordances that participants perceived and leveraged to achieve their goals: interacting, organising, automating, visibility, developing, providing customer support and fixing issues. Some affordances (i.e. interacting and organising) are nested affordances comprising the sub-affordances that constitute them. The seven affordances were grouped into four categories that represent four types of Discord affordances: core affordances that define the primary purpose of Discord; assistive core affordances that facilitate the core affordances; innovative affordances that introduce new features that Discord does not offer; and assistive innovating affordances that support the innovating affordances.

Two criteria have been used to differentiate between the four types of Discord affordance. The first criterion used to differentiate between core and innovative affordances was whether users utilise Discord's functionalities as provided by Discord, such as communicating with other people and organising their online communities, or they engage in generative use by using Discord functionalities to add new features that are not available on Discord by default, such as developing Discord bots to support task automation and integrating music streaming from other platforms. The second criterion used to differentiate assistive and non-assistive (core and innovative) affordances was whether the affordance is a standalone affordance

or subordinate affordance to other affordances that serve to facilitate leveraging these other affordances in the first place. Examples of such subordinate affordances include increasing the visibility of people interactions that serve to facilitate their ability to interact (which is a core affordance) and fixing programming issues that serve to facilitate users' ability to develop innovative Discord bots (which is an innovative affordance). The following sections will discuss each of the four types in greater detail.

4.2.1 Core affordances

The first type of Discord affordances are “core affordances”. These are called core affordances because participants leveraged Discord’s functionalities as provided by Discord. The main features of Discord centre around interacting with people through various means (text, voice, video), and many participants highlighted several times that they used Discord because of these features as they allow them to structure their interactions within Discord servers. The core affordances comprise interacting and organising affordances. Both interacting and organising affordances are constituted from sub-affordances. Communicating and collaborating sub-affordances make up the interacting affordance, while hosting events and structuring the community sub-affordances make up the organising affordance. Table 4.2 provides an overview of the core affordances, their constituting affordances, the number of participants who employed them (i.e. their prevalence), the features that enabled them, and participants' goals. The following two sections will explore the interacting and organising affordances and their nested affordances.

4.2.1.1 Interacting affordances

The interacting affordance was the most frequently utilised affordance among the participants, with 19 out of the 20 participants leveraging this affordance. The interacting affordance refers to the possibility of exchanging information through

various means, including text messages, voice and video calls, file and media sharing and emojis. This interacting affordance is enabled by Discord's voice, video and text chats features, where users can reply to messages already posted on the server, send direct messages, join voice chat channels, or make voice and video calls. The interacting affordances include two nested sub-affordances, each reflecting different goals of interactions, including the possibility to socialise and chat with other people (communicating sub-affordance) and the possibility to cooperate with others on specific tasks to achieve a mutual goal (collaborating sub-affordance).

Table 4.2. Discord's core affordances

Affordances		Definition	Prevalence	Features	User Goals	Representative Quotes
Core Affordances	Interacting	The possibility of exchanging information with others through various means (text messages, voice and video calls, files, images, emojis) by leveraging text and voice calls and screen-sharing features	19 participants	Text chat, voice and video calls, screen sharing	To communicate, collaborate and exchange information	"It is useful to have Discord in itself. It is just like a quick tool to message someone, and it is one of the fastest ways you can get into contact with someone" [P11] "Being able to share screen has become very useful for things like programming with a partner, being able to show 'Oh, this is what I have done so far, this is what we need to add, or this is what I am doing, it is not working, can you see an issue. Yes, it is this, or no, go ask the help channel'" [P5]
	Organising	The possibility of structuring the community and its members and host online events by leveraging Discord channels, roles, permissions and Discord bot features	17 participants	Discord channels, roles, permissions, Discord bots	To arrange the community and its members and run online events	"We are dealing with a couple hundred companies every week, which is crazy to think about. We are only two people. But Discord actually helps us to organise this because we have set up a private server that's completely hidden from anybody" [P16] "And hosting more like a variety of events, with everything coming through Discord, so all of the announcements are done through Discord. We did loads of extra game nights throughout the week through Discord" [p8]

For example, users utilise Discord's voice calls to chat with friends; this is a typical illustration of a communicating affordance:

> *[Discord] is a great communication tool. Again, this is like with the voice chat thing. It is about how convenient it is just to be able to talk with your friends, either in private or any group. [P13]*

A few participants highlighted the ease of communicating with others on Discord because of how it hosts voice chats. On Discord, voice chats are hosted by Discord in servers, which means it does not require a person to host calls like other platforms such as Skype. Skype calls require one person to initiate the call; it is then terminated once they leave the call. Hosting calls on Discord servers has made joining and moving between multiple voice chats easier for users, especially in a community with members with various interests. P6 distinguished between Discord and Skype voice chats:

> *[Discord] was more reliable and robust than Skype, and Discord hosts itself. So, it has dedicated servers to host the call. Whereas with Skype, you need one person to host the call, so if that one person leaves the call, the call goes down. Whereas Discord, it is a dedicated system. [P6]*

The interacting affordance is also exemplified by participants involved in software development projects. Such participants use Discord to collaborate with other developers when working on development projects. Some participants mentioned that they use Discord as a place to conduct internal communication within the project team and as a tool to undertake development projects. Discord allows participants to talk in voice chats while working on different tasks, use the screen sharing feature to live stream their progress and solve technical issues, and use text chat to send code lines and share files like documents, screenshots and other resources. Thus, the availability of these features in Discord and the smooth transition between voice and text channels enable them to collaborate. P14 commented that:

> *I would have to say, anytime that we are not just working by ourselves, any of the code development that's happening for the coding or for just pushing out releases, all that is done while we are all talking on Discord, whether that be in a voice chat or a text chat. [P14]*

4.2.1.2 Organising affordances

The organising affordance was leveraged by 17 participants. This affordance refers to the possibility of structuring the community and its members and hosting events. Structuring the community involves coordinating the server channels and setting up roles and permissions for members. Discord offers various features that support users to leverage organising affordances, such as customised channels, which users can use to organise the server into topic-specific channels, granting certain roles to members with specific permissions to coordinate and categorise them. Organising affordances comprise two nested sub-affordances: (1) structuring the community, which offers the possibility of arranging the server and its members; and (2) hosting events, which offers the possibility of setting up events.

The structuring the community affordance is a critical affordance that participants emphasised, particularly those within large servers. Participants from gaming societies noted that the customised channels feature on Discord allowed them to create multiple voice and text channels designated to specific topics. The ability to customise Discord channels helps create specialised channels such as “general chat”, where members can engage in general conversations about general topics; “announcements”, where the community owners share important information on upcoming events with the community members, and “rules”, where they post the community guidelines. Another feature that Discord offers that is considered helpful is Discord roles. Roles enable community admins and moderators to assign certain roles with specific permissions that grant role holders access to hidden channels. For instance, one gaming society president explained how all these features have allowed them to create game-specific text and voice channels as well as roles for these games so members can only access and see the game channels they are interested in to keep the Discord server tidy and organised:

> *One of the main reasons was being able to create roles for each of the games and kind of give multiple games different places to talk so you do not end up with mixed messages between, let us say, League of Legends and CSGO because these player bases are very different, so that would be probably the main reason that we chose to use Discord. [P5]*

Hosting events is also a sub-affordance that makes up the organising affordances. This represents an organising affordance as it offers the possibility of organising online and offline events. Organising tournaments within the community is an example of Discord's hosting events affordance. Discord can work as a hub where certain channels are designated to specific tournaments where they announce the tournaments and the requirements to participate and discuss the rules. Tournament organisers can assign roles to those participating in tournaments to access specific voice and text channels and identify the number of people participating in that tournament. P20 described how Discord's features were helpful for organising tournaments:

> *So in terms of organising our tournament, it [Discord] is a great tool for sharing information with our society reps and the players and teams themselves. So you may notice we have announcements channels, both the general one, which everyone can see, and we have an announcement channel for every single game. So, say the tournament signups have opened, we can let everyone know. I let very specific people know. And you can potentially ping people, which is sending people notifications if they have notifications turned on. And we will try to tailor these notifications to just the people that are interested in a particular topic or game […]. And then every week, we actually use the voice channels as well to host the captain's meeting. And the cool thing about captain's meetings is you can put an admin or the product manager for that game on a stage, and you have all the players and teams listening. [P20]*

4.2.2 Assistive core affordances

The second type of Discord affordances is called "assistive core affordances" because they have a facilitative role in leveraging the core affordances (i.e. interacting and organising affordances). Assistive core affordances include the automating and visibility affordances. For instance, the possibility of automating repetitive tasks in the community facilitates the organising affordance. Similarly, the ability to see other people's contributions facilitates further interaction within the community. Table 4.3 outlines the assistive core affordances with illustrative examples from the data

Table 4.3. Discord's assistive core affordances

Affordance		Definition	Prevalence	Features	User Goals	Representative Quotes
Assistive Core Affordances	Automating	The possibility of performing specific tasks automatically without human intervention	15 participants	Discord bots and webhooks	To automate repetitive tasks	"Certain bots allow you to sort of give roles out to people automatically. So if we did do like sort of authentication style where if you want to chat in here you need to be given a specific role, a bot can help us do that automatically" [P7] "…so to manage [the] community, we have our own bots, obviously, that do the automatic moderation like filtering, Discord invites and advertisements" [P11]
	Visibility	The possibility of seeing other people's information (e.g., messages and activities) as well as making your own information visible to other people	12 participants	Mentions, bots, Discord integrations, game activity, voice chat, server insights	To see other people's information	"In Discord, you just drop in, you usually just jump into a call or, for example, maybe other people are already in a call, you can see them visibly in a call. And you can just jump straight in" [P6] "The analytics features of Discord's community options allow you to track things such as member joins, message counts, etc." [P10]

4.2.2.1 Automating affordance

The automating affordance refers to the possibility of performing specific tasks without human intervention. 15 participants utilised the automating affordance. The underpinning features that enable the automating affordances are Discord bots that automatically moderate the community by assigning roles to community members, blocking raids, detecting and removing spam and offensive content, and Discord webhooks that automatically fetch other platforms' information into Discord.

One example of the utilisation of automating affordances is using Discord's anti-raids bots. Discord communities are prone to bot attacks seeking to scam their members by sending them private messages to get their personal information. Some participants demonstrated the measures they took to prevent these attacks by using anti-raiding bots. Anti-raiding bots help automatically detect potential attacks and ban bot accounts from the community as soon as possible before such attacks inflict any damage on the community. P20 explained how they leveraged Discord's automating affordance to prevent bot raids and spam attacks:

> *We use [Discord bot 1], which is an anti-raid bot, which Riot Games actually uses for their Discord servers. And we also use [Discord bot 2]. [Discord bot 1] has a common list of bots, which, from every server it is in, it kind of logs those bot accounts that have been identified and bounced them across all of the servers it is in, which is a really useful tool. And both of them actually can recognise when lots of bots join a server at the same time, and it is very obvious that we are being subjected to a bot attack. So they basically can kick and ban them very quickly, therefore limiting any damage that these bots can do. [P20]*

The automating affordance can be viewed as an assistive affordance as it facilitates the core organising affordance. For instance, auto-moderation Discord bots can automate some processes, such as assigning roles to community members by enabling community members to interact with the bot to get community roles without the moderator's intervention, which facilitates the community structure. P6 stated:

> *We have got some bots that are administrative, so these are technical bots that can manage our server and help moderate with us and give us extra tools when it comes to managing people and the server itself. [P6]*

4.2.2.2 Visibility affordance

Visibility affordance refers to the possibility of seeing other members' information, such as their messages and activities on the server, as well as the possibility of making one's own information visible to other people. Twelve participants utilised the visibility affordance. The features that enable the visibility affordance are Discord integrations, Discord bots, activity status, server insights and mentions.

Discord's voice channel is a critical feature that enables the visibility affordance. It allows community members to see other people in a specific voice chat and what they do if they share their screens. One participant described how they utilised the visibility affordance to oversee the meetings of their team members. They stated that the visibility affordance has helped in reducing the time spent on following up with their team members on what they are doing because other members of the server can see who is in the voice channel and what they do:

> *In the server, you can have a voice channel. Usually, you will have multiple voice channels like the kitchen, the relaxation room, and the conference room. For example, in our daily meeting, we say that well, two team members, Jen and Maria, need to talk to each other because they need to clarify something. I will let them meet. But I do not know that they met, we will have to ask them, did you guys meet? But because Discord is so integrated, I will see them both in the voice channel. And I will know that they met already. Yeah, that is critical. [P19]*

The possibility of seeing other community members' contributions and activities can be considered a facilitating affordance for interactions and engagement in a conversation with other members. A content creator compared interactions between YouTube and Discord and clarified how Discord's visibility affordance promoted more interactions in the Discord community:

> *As I said, [Discord] remains an easier communication method. I mean, you can discuss with people who ask you for something at the same time that they ask for it, unlike YouTube, which sends you a notification that there are some comments. You go to see the comment, and sometimes you miss a comment. While in Discord, they can mention you, and you can see that someone mentioned you, and you talk to him. This is a nice thing. You reply to the person who wrote the comment or ask for a game, and when you reply to him, other people will see the discussion and join the conversation with you. I mean, there will be much more interaction. [P3]*

4.2.3 Innovative affordance

The third type of Discord affordance identified is innovative affordance. This type of affordance is referred to as innovative because users leverage it to make novel changes to the platform by adding features to improve the functionality of Discord. The analysis identified only one kind of innovative affordance: the developing affordance. The developing affordance is leveraged by participants to mainly create Discord bots and add features that suit their needs. Table 4.4 provides an overview of the innovative affordance.

4.2.3.1 Developing affordance

The developing affordance was leveraged by 11 participants. This affordance refers to the possibility of making bots that extend Discord's feature set by adding features beyond its native offerings. Creating a Discord bot that plays music in Discord's voice channels is an example of a developing affordance. Discord's Application Programming Interface (API) is the feature enabling the developing affordance. Participants utilised Discord's API to develop custom bots with specific features or integrate other platforms or services' features into Discord.

Table 4.4. Discord's innovative affordance

Affordance		Definition	Prevalence	Features	User Goals	Representative Quotes
Innovative Affordance	Developing	The possibility of creating apps that add new features not initially offered by Discord	11 participants	Discord API	To add new features not natively provided by Discord	"So [the bot] is about better music playback. It allows people to play music on Discord together. Discord does have Spotify integration, which allows people to listen together, but it is not optimal. So we developed a bot that plays music on voice channels in Discord so that you can, while talking or like playing a game, that you can listen to music, and that people can collaborate or play together and so on" [P11] "But one of the things that we can make very simply at a bot level is these things called rich embeds. And effectively, what they are is they take what would usually just be like a normal text message. And it allows you to group it and make it a lot cleaner. So if you have ever seen, like, when you link a YouTube video or something like that, it sort of has like a title, it has like a picture attached to it like a thumbnail, sometimes a little description, and it kind of wraps it in like a colourful little box" [P14]

The developing affordance is exhibited when some participants utilise Discord's API to create the so-called "reaction bots". Reaction bots allow server members to react to messages within the server. These reactions are emoji-based responses that members use to reply to messages, including thumbs up (👍) and thumbs down (👎). Some participants noted that assigning roles to community members is daunting because community members have to contact the admins or moderators, asking them to manually give them specific roles within the community. Therefore, the participants decided to develop Discord bots that enable users to automatically get roles by reacting with emojis to the bot posts or messages. Such a reaction role feature was not natively built into Discord. The participants added it using the bot, which was helpful for communities, especially larger ones where some of the server channels are visible to specific roles and hidden from others. Reaction role bots also saved server admins and moderators time and effort by allowing community members to self-assign their desired roles. P14 described the reaction roles bots:

> *One of the most popular features is what we refer to as 'reaction roles'. So effectively, if you react with a certain emoji to a message, it will give you a role. If you remove that reaction, it removes the role. So that is probably one of the most common features and most requested things that Discord does not inherently offer. [P14]*

4.2.4 Assistive innovating affordances

The last type of Discord affordances identified is assistive innovating affordances. These affordances are called "assistive innovating" because they support innovative affordance (developing affordance) and are related to developing Discord bots. The assistive innovative affordances comprise fixing issues and providing customer support affordances. Thus, solving problems associated with developing a Discord bot and responding to customers' (users of the Discord bot) questions and requests would improve the overall performance of Discord bots. Table 4.5 provides illustrations of Discord's assistive innovating affordances

Table 4.5. Discord's assistive innovating affordances

Affordance		Definition	Prevalence	Features	User Goals	Representative Quotes
Assistive Innovating Affordances	Fixing issues	The possibility of solving programming issues and seeking help from other people	9 participants	Discord servers, text chat, webhook	To solve programming or coding errors	"Discord's webhook integration is also very nice. It allows us to keep track of our git commits, stars, forks, workflows, and also allows us to keep track of any errors the bot runs into and immediately start debugging them" [P10] "I'm in a bunch of servers for all of these different help servers, so if I have an issue for those, I can message in one of those […] and, just the fact that there are so many people on Discord, get answers in a matter of minutes" [P5]
	Providing customer support	The possibility of responding to customers' questions and issues regarding the use of the Discord bots	7 participants	Discord servers, text chat	To answer customers' questions and problems when using Discord bots	"…pretty much my role in that server [the support server] is mostly that as we have questions or feedback, or bugs that get reported, either myself or one of the other developers, we typically try to respond as quickly as we can to give either again, either support; if it's a bug, we might ask additional questions to follow up on to see what the root cause is" [P14] "For the partners only server, we actually do have [support server]. Obviously, it's only for the partners, and we offer faster support prioritised support. So if we see a message pop up in that server, we try to answer it before we help anyone else" [P12]

4.2.4.1 Fixing issues affordance

The fixing issues affordance was utilised by nine participants. This refers to the possibility of solving programming and coding issues that participants encounter whilst developing Discord bots. Discord servers, text channels and Discord webhooks are the underlying features that prompted the fixing issues affordance. For instance, when participants face coding errors, they often seek help from others in development communities on Discord to solve these issues.

On Discord, there are development servers that are specific to programming languages and libraries. Many of these servers have Q&A channels designated to ask about coding-related issues. Participants reported that they often go to these servers to seek assistance from other members who are familiar with similar issues to solve their programming problems when developing Discord bots. P14 gave an account of how they utilised Discord's development servers to solve issues they might face when developing bots:

> *We have reached out to some of the developer communities that are out there. There is, every bot development site has its own community. So we are involved in a lot of these […]. And inside of there, I want to say there are actually Discord developers that also engage with the community, and we have asked tonnes and tonnes of questions in there over the years with very specific questions or issues that we are running into to try and see who else has run into this and what their workarounds are. [P14]*

The fixing issues affordance can be viewed as an assistive innovative affordance since these development servers on Discord represent a valuable resource for participants to promptly solve programming problems they encounter when developing bots. P9 stated:

> *When I am programming [the bot], and I have a problem, and I want to ask someone, I will go to a public server and talk to them or go to a public channel and talk to them directly like we do now and solve my problems. [P9]*

4.2.4.2 Providing customer support affordance

Providing customer support is the least common affordance and was leveraged by only seven participants. It refers to the possibility of responding to customers' questions and issues regarding using Discord bots. Customers in this context are the people using the Discord bots

that the participants developed. Discord servers and text chat are the main Discord features that enable this affordance. Discord bots' support servers are an example of the providing support affordance, where bot developers create a support server for their bots on Discord to answer users' questions.

A few participants who developed Discord bots opted to create a support server on Discord for their bots where they interact with their customers (i.e., those who use their bots). Support servers are essential for people who develop bots because the bot users can ask questions about how to use the bot, report issues and bugs, and offer suggestions for adding new features. P11 explained the value of having a support server on Discord:

> *We obviously want to provide people with help if they have an issue with [the bot]. When they do the help command, for example, we put a link to the server so they can find staff who know what they are doing to help them with [the bot]. Secondly, we have a place for feature requests. So people can say what they are missing and offer feedback in general, positive or negative. [P11]*

The providing customer support affordance is classified as an assistive innovative affordance because it involves continuous improvement of the bot. When developers engage with their customers (or the bot end users), they listen to their feedback about the bot's performance and requests for new features that can extend the bot's functionalities. P19 highlighted how providing customer support facilitates the developing affordance where they offered customer support through the support server to create a channel for feature suggestions because their bot was new:

> *We have the support for people to come in to ask us questions. They come in to understand how to do several things. And I made a channel for feature requests because it [the bot] is quite young. And now we give them the ability to test our products on our support server. [P19]*

4.3 Institutional Logics

The second analysis step entails identifying the institutional logics that participants revealed and drew on in the interviews. This step involves identifying the components of institutional logics that are evident in the data. As discussed in the Methodology chapter (section 3.5.1.2), these components are:

1. Principles: the goals associated with the institutional logic.
2. Source of legitimacy: the basis for judging whether actors and their actions are trustworthy and acceptable to others.
3. Source of identity: how actors identify themselves within the logic based on their role and social identities.
4. Focus of attention: the actions and practices associated with the logic that actors attend to when drawing from the logic.

The construction of "institutional logics profiles" (see Methodology chapter, section 3.5.1.2) is valuable in capturing the goals, norms, values and practices pertaining to each institutional logic. Based on this analysis, three prominent institutional logics are identified: *community*, *professional* and *entrepreneurial* logics. The analysis of the institutional logics profiles also revealed that most participants drew from multiple institutional logics. 15 participants drew from multiple logics (a combination of either community and professional logics or community, professional and entrepreneurial logics), whereas only five participants drew from a single institutional logic (only the community logic). The following sections will detail the identified institutional logics and discuss their components.

4.3.1 Community logic

The community logic was the most common logic and all 20 participants embraced it. The community logic's *principle* is to create and maintain a boundary. This boundary sets the limits that define the community's content and separates those who are part of the community from others who are not members. Examples of such boundaries include: engaging in software development (for communities organised around software development); playing video games (for communities built around video games); and participating in video game tournaments (for communities around Esports and tournaments). The *source of legitimacy* under community logic stemmed from adherence to the community-specific norms and from the alignment of the members' goals. Members of the community are seen as trustworthy and their actions are acceptable if they and their actions follow the community norms. Norms can either be implicit and learned and observed over time through interaction within the

community (e.g., not using capital letters in messages as it is considered shouting) or they can be explicit and defined through community guidelines (e.g., no self-advertising or spamming messages). Legitimacy in the community logic can be gained through goal alignment, where members pursue goals that are shared by other members of the community. The *source of identity* in the community logic originates from the position in the community and the sense of belonging. Followers of community logic often identify themselves in terms of their role identity through the position they occupy in the community (e.g., admin, president, moderator), or they identify themselves in relation to their social identity through membership in a particular community (e.g., member of Python programming community). The *focus of attention* for participants drawing from the community logic is on community engagement and interaction. Such engagement and interactions are demonstrated through active involvement in the community and personal contribution of content, posting messages, asking questions, engaging in discussions and helping fellow community members. Table 4.6 summarises the community logic components.

Table 4.6. Community logic components

Dimension	**Characterisation**	**Evidence Count* (20 participants)**	**Representative Quote**
Principles	Create and maintain a boundary	15	"The main goal for the society was for people to come in and just have fun and relax after a long day of work from uni. They are here to sort of meet friends and just play different games" [P7]
Source of Legitimacy	Adherence to community norms	7	"The majority of the tournament is trust-based. And there have definitely been people that have abused that trust-based system before and have received bans for it before" [P20]
	Goal alignment	4	"And if they [members applying for a moderation role] seem to align with what we expect, we give them a trial stage, and from there on, they become part of the team over the long run […] but at the end of the day, they had certain loyalty that stands out in comparison to a lot of other people. So they are the most trustworthy people we've got" [P16]
Source of Identity	Position in the community	7	"I'm the Discord manager on the committee, so that's kind of all of my jurisdiction" [P6]

Dimension	Characterisation	Evidence Count* (20 participants)	Representative Quote
	Sense of belonging	10	"I joined Discord probably back in 2016 or 2017. I joined because of a YouTuber, and I was like a part of the community thing" [P15]
Focus of Attention	Engagement and interaction	19	"And I think a lot of people really engage within the society, and it builds up relationships with other places as well. Like, we have relationships with other universities because of using stuff like Twitter and Facebook, and I find that to be a really interesting way of building up a wider community" [P8]
*Evidence count refers to the number of participants that exhibit evidence for each component. For example, 15 out of the 20 participants who drew from the community logic showed evidence of the community logic principle "create and maintain a boundary", and 7 out of the 20 participants that drew from the community logic showed evidence of the community logic source of legitimacy "adherence to community norms"			

4.3.2 Professional logic

Professional logic was the second most common institutional logic and 15 participants espoused it. Professional logic is built on the *principle* of pursuing an interest. Interest refers to personal attraction to a particular craft or field. Such personal interests are driven by the participant's passions or curiosities about a particular professional field, which, over time, through continuous learning and experimentation, develop relevant skills and acquire knowledge that fuels their passion and transform them into a professional activity. Thus, participants' passion and initial curiosity serve as the foundation upon which they enhance their skills and deepen their expertise to enable them to turn their passion into a profession. Interest in the professional logic differs from boundaries identified in the community logic, where the former is centred on personal passion, while the latter is associated with a collective space for groups of individuals. For instance, one person may be passionate about Discord bot development and draw from professional logic to create a Discord server to collaborate with other developers. At the same time, the person may draw from the community logic to engage in software development servers on Discord. Therefore, in professional logic, participants invest their time and effort in gaining relevant knowledge, skills and expertise to pursue that interest. The *source of legitimacy* in professional logic is

gained from personal expertise and reputation in a specific area. Participants' experience and knowledge enable them to gain respect from others and make them trustworthy. Similarly, the reputation of participants in terms of their achievement (e.g., gaining partnerships or reaching certain milestones in terms of the number of followers) enables them to gain legitimacy in the professional logic. The *sources of identity* for professional logic are status and education. Status, which represents the role identity, refers to the relative position of participants compared to others and originated from occupational roles (e.g., lead developer or project manager). Participants also sometimes identify themselves in a profession based on the education they have received, representing their social identity, for example, studying computer science to identify with the software development profession or having a degree in creative writing to identify with the writing profession. The professional logic *focus of attention* is on adhering to established practices, collaboration and learning. Thus, to pursue an interest, participants are expected to: (1) conform to the commonly-followed practices developed and enacted over time by other professionals; (2) collaborate with others on projects to achieve common goals; or (3) learn through experimentation and testing. Table 4.7 outlines the professional logics components.

Table 4.7. Professional logic components

Dimension	Characterisation	Evidence Count (total 15 participants)	Representative Quote
Principles	Pursue an interest	9	"What motivated me for streaming was simply because I had free time. And in this free time, whether I was streaming or not, I was sitting on the computer and playing video games. So I said, 'Why don't I stream? I was playing anyway, so it won't cost me anything more.' Since then, I started streaming, and after that, I started making videos on YouTube, and it was a hobby for me." [P1]
Source of Legitimacy	Expertise	4	"So when I came around with the experience and the interesting agenda that I have, it was basically a very easy call for him to talk to me and get me on board. So when I was assigned a few tasks, he saw that I was absolutely smashing it. He basically wanted more and more and more" [P16]
	Reputation	4	"I have a partnership with Discord, so from time to time, they send us surveys asking us what you like and what would you like to add […] there are some metrics that you need to reach in order to get a partnership, for example, you will need to have 50

Dimension	Characterisation	Evidence Count (total 15 participants)	Representative Quote
			people who joined the voice channel per week, not at the same time but during the week who joined the voice chat and communicated or played together" [P3]
Source of Identity	Status	9	"At first, I didn't do a lot on it as I was new to general programming languages. But after learning quite a bit, I am now the primary developer, and I handle PR/Hosting/etc" [P10]
	Education	3	"I have a bachelor's degree in English with an emphasis in creative writing, and then a master's degree with the same thing in English with an emphasis in creative writing. I am a freelance writer now" [P18]
Focus of Attention	Adhering to established practices	12	"But like in the support we are likely to talk to the community. We have the announcements, we have the support for people to come in to ask us questions, they come in to understand how to do several things […] And this is kind of classic for all the bots on Discord that they have a server, they have announcements, they have support, they have testing" [P19]
	Collaborating	9	"So I use Discord pretty much for everything now if I'm working on a project, I typically just make a little server for it and have everybody in there that I'm working with" [P12]
	Learning	10	"[The bot] started out as like experimentation with the Twitch API and just kind of seeing what it could do. And then I got a couple of people that said, "Hey, I'm interested in this, could you build upon it more", and I guess it grew from there" [P13]

4.3.3 Entrepreneurial logic

Entrepreneurial logic was the third common logic in the data, and 11 participants embraced it. The logic *principle* emphasises creating value. This value involves identifying and addressing general needs or problems shared with others. It also includes offering products or services to fulfil these needs. The *legitimacy* of the entrepreneurial logic is attained through audience acceptance. That is, the number of people who support and use these products and services (e.g. the number of people who use participants' Discord bots). Thus, the audience's willingness to engage and endorse the participants' products or services makes the

participants accepted or trustworthy. The absence of a *source of identity* characterises entrepreneurial logic. No evidence was found in the data for the source of identity. Hence, there was no sense of identity in the entrepreneurial logic that was observed for this category of Discord users. The absence of identity might be because participants do not see themselves as entrepreneurs, especially since most of the products or services they offer started as hobbies or to address their personal needs and then developed and were shared with the audience. The *attention* of entrepreneurial logic focuses on solving problems, monetisation and providing audience support. Under the entrepreneurial logic participants can create value by solving problems and addressing challenges that are common in a particular context. Monetisation also attracts the participants' attention by making money from their products or services through offering premium subscriptions, paid advertising and attracting sponsorships and partners. Consequently, as participants provide products or services to the public, they focus on delivering premium support to their paying audience, for instance, offering prompt support to paying audiences in the context of Discord bot developers, or private communication channels with Twitch subscribers in the context of content creators. Table 4.8 presents an overview of the entrepreneurial logic components.

Table 4.8. Entrepreneurial logic components

Dimension	Characterisation	Evidence Count (total 11 participants)	Representative Quote
Principles	Create value	10	"But our ultimate goal is to offer you a product or offer you a service that lets you have a better experience with your community" [P14]
Source of Legitimacy	Audience acceptance	8	"Currently, it's [the bot] in about 200,000 servers. And, we kind of started out around four years ago, a little over four years ago [...] it's kind of gained a lot more popularity than I initially expected it to have" [P13]
Focus of Attention	Solving problems	7	"The reason [the bot] was made is mostly because we were unsatisfied with the music bots that were in Discord, mostly because of lacking features, but also because of bad user experience and whatever. And as the numbers show, we were not the only ones that had that feeling" [P11]
	Monetisation	3	"I mean, Facebook is an excellent platform. I see it as an excellent platform for the gaming community. If you can get partnered with Facebook, you will get a fixed salary

Dimension	Characterisation	Evidence Count (total 11 participants)	Representative Quote
			and a good one depending on the viewership and the interaction you have" [P3]
	Providing audience support	6	"…a premium support area, which we look at a little more closely as people go into it or we provide more kind of detailed support, if that makes sense. So rather than if we just usually tell you, "Oh, here's how you do it", we might offer to say, "Hey, you can invite us to your server, and we could just do it for you and might look over some other stuff" [P14]

4.4 The Relationship Between Discord Affordances and Institutional Logics

Examining the relationship between Discord affordances and institutional logics followed the three data analysis steps discussed in the Methodology chapter (section 3.5.1.3):

1. Examining the relationship between Discord affordances and each institutional logic individually.
2. Examining the relationship between Discord affordances and the single and multiple institutional logics (i.e., simple versus complex contexts).
3. Examining the relationship between Discord affordances and configurations of multiple institutional logics.

The subsequent sections will present the findings for each of these steps.

4.4.1 Discord affordances and individual institutional logics

The first step in analysing the relationship between Discord affordances and institutional logics involved individually examining the affordances leveraged by participants under each institutional logic. This analysis considers whether participants used Discord differently depending on the institutional logic they followed. Table 4.9 shows the results of the matrix coding query conducted in the analysis (as discussed in the Methodology chapter, section 3.5.1.3). The analysis is done at the level of the participants (i.e. one participant can follow

one or multiple institutional logics and leverage one or multiple affordances). The numbers in the table pertain to the number of participants who leveraged the affordances in relation to the total number of participants who drew from the same institutional logic. For example, of the 20 participants who drew from the community logic, they all (100%) leveraged the core affordances, while 11 (55%) leveraged the innovative affordance. The numerical data and percentages in Table 4.9 (and in the tables in the following sections) served as a guiding tool to reveal possible patterns, which were later explored by examining the interview data to verify these patterns.

Table 4.9. The relationship between Discord affordances and individual institutional logics

Logics / **Affordances**	**Community Logic (20 participants)**	**Professional Logic (15 participants)**	**Entrepreneurial Logic (11 participants)**
Core	**20 (100%)**	**15 (100%)**	**11 (100%)**
Interacting	19 (95%)	14 (93%)	10 (91%)
Organising	17 (85%)	13 (87%)	9 (82%)
Assisting Core	**17 (85%)**	**12 (80%)**	**9 (82%)**
Automating	15 (75%)	11 (73%)	9 (82%)
Visibility	12 (60%)	7 (47%)	5 (45%)
Innovative	**11 (55%)**	**11 (73%)**	**8 (73%)**
Developing	11 (55%)	11 (73%)	8 (73%)
Assistive Innovating	**10 (50%)**	**10 (67%)**	**8 (73%)**
Fixing issues	9 (45%)	9 (60%)	8 (73%)
Providing customer support	7 (35%)	7 (47%)	5 (45%)

As shown in Table 4.9, this analysis did not uncover any discernible patterns linking the individual logics under which participants operated and the affordances that they leveraged. The core affordances were leveraged by all participants regardless of the logic they followed. This finding was anticipated since core affordances reflect Discord's essential affordances. Many participants reported using Discord because it allowed them to talk in a structured way. Similarly, there was no significant difference in assisting core affordances across the three logics. Most participants leveraged assisting core affordances, which was not surprising because they support the core affordances. There was, however, a slight variation in the patterns for innovative and assistive innovating affordances. Most participants following the

professional and entrepreneurial logic leveraged these affordances, compared to only half who were following the community logic. Nevertheless, this finding was also expected as most participants who developed Discord bots and leveraged the innovative affordance were driven by their interest in programming or creating value by solving common problems. Thus, no patterns were detected when analysing the relationship between individual logic and Discord affordance, which moved the analysis to the second step.

4.4.2 Discord affordances and single versus multiple institutional logics

The second step of analysing the relationship between Discord affordances and institutional logics encompassed examining the affordances leveraged by participants who followed a single logic and those who followed multiple logics. This approach was employed to reveal possible patterns of leveraging Discord's affordances in simple (single logic) and complex (multiple logics) contexts. From the data, only five participants drew from a single logic – the community logic – while 15 participants drew from a combination of multiple logics – community with professional and entrepreneurial logics (11 participants) and community with professional logic (4 participants). It is important to note that the presence of just these three logic combinations (community only, community and professional, and community, professional and entrepreneurial) in the data is due to the nature of Discord. Discord was designed with an emphasis on community development, making it a suitable platform for building online communities rather than, for instance, as a platform for budding entrepreneurs to capture value from their ideas. As a result, all participants drew from the community logic, while the entrepreneurial logic was much less prevalent and only observed in the presence of the professional logic as users were leveraging Discord to capture value by exploiting their professional presence on the platform. This explains the absence of other instances, such as participants drawing only from professional or entrepreneurial logic or different combinations, such as community with entrepreneurial logic. Table 4.10 compares the results of examining the relationship between Discord affordances leveraged by participants in single and multiple institutional logics.

Table 4.10. Relationship between Discord affordances and single versus multiple logics

Affordances	Single Logic (5 participants)	Multiple Logics (15 participants)
Core	**5 (100%)**	**15 (100%)**

Affordances	Single Logic (5 participants)	Multiple Logics (15 participants)
Interacting	5 (100%)	14 (93%)
Organising	4 (80%)	13 (87%)
Assistive Core	**5 (100%)**	**12 (80%)**
Automating	4 (80%)	11 (73%)
Visibility	5 (100%)	7 (47%)
Innovative	**0 (0%)**	**11 (73%)**
Developing	0 (0%)	11 (73%)
Assistive Innovating	**0 (0%)**	**10 (67%)**
Fixing issues	0 (0%)	9 (60%)
Providing customer support	0 (0%)	7 (47%)

The results of this analysis reveal that both core and assisting core affordances were equally leveraged by participants in simple and complex contexts. Considering that core affordances are related to the main purpose that participants use Discord for, it is unsurprising that no significant differences in leveraging the core and assistive core affordances among participants were found depending on whether they operate in simple or complex contexts. Interestingly, the table shows a major difference in the visibility affordance. All participants in the single logic leveraged the visibility affordance compared to half of the participants in multiple logics. This might be attributed to the fact that participants in a single logic operate in one social space (i.e., one Discord server). They have a high commitment to that community through investing time in contributing to it and prefer to have their contributions made visible to the community members. In contrast, those who are part of multiple Discord servers have less commitment and invest less time in these multiple servers.

There is, however, a significant discrepancy in innovative and assistive innovating affordances across participants operating under single and multiple logics.[9] Innovative and assistive innovating affordances were only leveraged by participants drawing from multiple logics, while no participant who drew from a single logic leveraged either affordance. This indicates

[9] The analysis also involved a step exploring the relationship between Discord affordances and the different combinations of institutional logics as an attempt to explain the difference between single and multiple logics. However, this is not discussed here as it revealed no significant differences. Appendix 2 discusses the results of this analysis.

that users who draw from multiple logics are likely to utilise Discord API to develop Discord bots that can perform certain tasks.

One possible explanation for this discrepancy is that Discord users are often members of different servers or occupy different roles within the same server. These Discord servers embed different institutional logics with diverse values, norms, assumptions and expectations. Thus, participants who are members of various Discord servers operate in different social contexts and are exposed to varied goals, interests and ways of thinking and doing things pertaining to each server they are part of. This exposure may result in a higher tendency to identify problems as they become aware that similar activities or practices can be done in different and more efficient ways. For instance, a user can be a member of a gaming community, drawing from the community logic and, at the same time, a developer drawing from the professional logic in the support server for their bots. Thus, this association with different servers and drawing from different institutional logics promotes creativity and innovative ideas, enabling participants to gain diverse perspectives and insights. Hence, participants who draw from a range of institutional logics can see things differently, understand different ways of doing things, and identify problems and opportunities. They can draw from the knowledge gained from multiple logics to devise innovative solutions to existing problems or exploit potential opportunities.

P14 presents an example of how exposure to diverse values, norms and ways of thinking due to being a member of multiple Discord servers can promote innovative behaviour. P14 developed a “multi-purpose” Discord bot that offers a range of features and they were a member of several Discord servers: (1) the friends server, where they drew from the community logic to interact with their friends; and (2) the support server, where they drew from the professional logic to provide support for their bot users and to collaborate with other co-developers, and the entrepreneurial logic, where they offered premium customer service to people who paid for the premium bot subscription. P14 stated that they came up with the idea of the bot when they were creating gaming communities. They wanted to give community roles to members based on certain requirements. For example, rewarding active members for their contributions (i.e., messages) within the community by awarding them points that would grant them certain roles. The bot idea emerged due to being involved in

different Discord servers and being exposed to different ways of doing things on these servers. As P14 explained:

> *So I just began using it [Discord] with a few friends […]. So some of our gaming communities started to use it as well. And by then, it kind of became a daily tool. So to now, you know, it's pretty much my main form of communication to keep up with a lot of different people […]. So as a developer, when I load up Discord every day, a lot of what I will initially look for is our support server […]. So the initial idea [of the bot] at the time, I was in the process of setting up a new gaming community of all things. And I was trying to do certain things so that you had to basically react to a message before you could actually join the server. I wanted to make it so I could give you certain roles based on certain requirements. And although there were existing bots and applications that did that, I didn't really like how restrictive they were and how they did it. And I didn't like the idea of having to have 30 different bots, all doing one specific task; it got really difficult to manage. [P14]*

4.4.3 Discord affordances and the configurations of multiple institutional logics

The third step of analysing the relationship between Discord affordances and institutional logics involved examining the relationship between Discord affordances and the configurations of multiple institutional logics. The term "configurations of multiple logics" denotes how multiple logics coexist and exercise their influence over actors. The identification of logics configurations was based on two dimensions that emerged from the analysis (as discussed in the Methodology chapter, section 3.5.1.3):

1. The *social space* where participants drew from multiple logics. In the context of Discord, social space refers to the Discord servers that participants are part of. The social space encompasses diverse audiences with whom participants interact and socialise within different Discord servers.
2. The *timeframe* where participants drew from multiple logics. This timeframe refers to whether participants drew from multiple logics separately at different times or simultaneously at the same time.

According to these dimensions, two variations of logics configurations were discerned from the data: supportive logics configuration and separated logics configuration. The following sections will discuss the two logics configurations.

4.4.3.1 Supportive logics configuration

Supportive logics configuration refers to a situation where participants draw from two or more institutional logics simultaneously in the same space (i.e., Discord server) for the same audiences at the same time. In the supportive configuration, multiple logics coexist and impose institutional demands on actors in one social space. Thus, the same Discord server is simultaneously influenced by several institutional logics. Of the 15 participants who drew from multiple logics, the supportive logics configuration appeared for 11 participants.

The supportive logics configuration was identified when there was evidence of compatibility and mutual reinforcement between multiple logics components within the same social space. For example, one participant articulated how the writing Discord server they were part of helped their professional career. Within that server, they drew from the community logic, where they talked to other writers and sought peer support. At the same time, they drew from professional logic to build a rapport and network with other professional writers. Engaging and interacting with other writers (the focus of attention of the community logic) supports building professional networks with other professional writers (the focus of attention of the professional logic). As such, they were drawing from the community and professional logics simultaneously in the same space (the writing Discord server) for the same audience (other writers in the writing server) at the same time. As the participant explained:

> *I also feel like this group [the writing Discord server] is going to be really good for my writing career with talking with other writers who are ambitious and doing cool things […] there's a lot of peer support in the writing community, which is great. So you never know when an opportunity will appear […], and I just wanted to create some rapport and connection with people in the writing world. [P18]*

4.4.3.2 Separated logics configuration

The other logics configuration identified in the data is called the separated logics configuration. The separated logics configuration refers to a situation where participants draw from two or more institutional logics independently in different social spaces (i.e. Discord servers) for different audiences at different times. In the separated configuration, multiple logics exist separately, and each logic imposes its institutional demand on actors in

distinct social spaces. Thus, each Discord server has a prevalent institutional logic, and participants draw from that logic in the respective server. The separated logic configurations appeared for only four participants out of the 15 who drew from multiple logics.

The separated logics configuration was identified in the data when there was evidence for the presence of different institutional logics clearly contained in distinct Discord servers. For instance, some participants drew from the community logic where they engage and interact with their friends in one Discord server. The same participants could also draw from professional logic, where they develop a Discord bot and create a separate Discord server to test the bot's performance. Accordingly, evidence of the community logic components was observed in the friends server, where they focus on engaging and interacting with friends (i.e. the focus of attention of the community logic), whereas evidence of the professional logic components was observed in the bot server, where they focus on adhering to established practices of bot developers (i.e. the focus of attention of the professional logic). Consequently, they drew from multiple logics (community and professional) separately in different spaces (the friends server and the bot testing server) for different audiences (friends and co-developers) at different times. P17 elaborated:

> *When I just use Discord as a normal person, I just hang around with some better friends I have, some friends that I've actually met in real life despite living in different countries […] what I do that most people do not is, test the bot. For instance, I have a bot testing server, which is where I do a lot of work because that is usually how people test things in practice […], but I would still say that I am pretty much a typical user of Discord outside of my development stuff. Like I do hang out in just normal servers. [P17]*

4.4.3.3 Discord affordances and separated versus supportive logics configurations

Following the identification of the two institutional logics configurations, the analysis explored the relationship between Discord affordances and the separated and supportive logics configurations. The results of this analysis are presented in Table 4.11. As was expected, there were no significant discrepancies in the core and assistive core affordances between the separated and supportive configurations. However, organising and automating affordances were intensely leveraged by participants in the supportive configuration compared to participants in the separated configuration. This difference could be attributed

to the fact that leveraging organising and automating affordances requires specific permissions and control over Discord servers. In the supportive configurations, participants drew from multiple logics within the servers they owned and had full control over them, unlike those in the separated configuration where participants were members of other people's servers and did not have control over these servers.

Table 4.11. Relationship between Discord affordances and separated versus supportive logic configurations

Affordances	Separated Configuration (4 participants)	Supportive Configuration (11 participants)
Core	**4 (100%)**	**11 (100%)**
Interacting	4 (100%)	10 (91%)
Organising	2 (50%)	11 (100%)
Assistive Core	**3 (75%)**	**9 (82%)**
Automating	2 (50%)	9 (82%)
Visibility	2 (50%)	5 (45%)
Innovating	**4 (100%)**	**7 (64%)**
Developing	4 (100%)	7 (64%)
Assistive Innovating	**4 (100%)**	**6 (55%)**
Fixing issues	4 (100%)	5 (45%)
Providing customer support	1 (25%)	6 (55%)

It is also clear from Table 4.11 that innovative and assistive innovating affordances were leveraged by all participants in the separated configuration compared to half of the participants in the supportive configuration. One possible explanation for this finding is the variety of participants' knowledge sources in the separated configuration.

As discussed above (in sections 4.4.3.1 and 4.4.3.2), participants in the separated configurations draw from multiple institutional logics in different servers and engage with wider audiences within these servers. In contrast, participants in the supportive configuration draw from multiple logics in the same server and engage with the same audience. Consequently, while participants in both configurations are exposed to multiple logics that drive innovation, the difference is the number of servers (i.e., social spaces) where they draw from logics where each server is influenced by a dominant institutional logic that acts as a distinct source of knowledge. By being a member of different servers and having these diverse

sources of knowledge, participants in the separated configuration are able to recognise ideas and opportunities more than those in the supportive configuration who draw from multiple logics in one server. Therefore, participants in the separated configuration apply this knowledge from various servers to develop Discord bots, explaining why they all leverage innovative and assistive innovating affordances.

The variation of knowledge sources was reflected in the degree of novelty in the Discord bots' features developed by participants in separated configurations. All participants in the separated configuration developed Discord bots with niche features inspired by problems or opportunities they noted while interacting within different servers. Such features include verifying students' accounts in university gaming societies, creating temporary voice channels, creating a "mod log" to register moderators' actions against community members, and developing a Scrum bot with Jira integration (project management tool used by software developers to collaborate). For instance, P9, who draws from the community, professional and entrepreneurial logics in different Discord servers, stated that the idea for their bot feature to create a temporary voice channel was a response to the need for multiple voice channels for friends who play different games:

> *Basically, I was frustrated because I wanted to create a lot of channels for my friends. So, if someone wanted to play with someone else, you had to create a lot of channels so that many people can play other games so that they don't interfere with one another. And basically, I wanted a bot that spawns voice channels so when you enter a voice chat, it creates a new one […] so you enter a portal channel, and it moves you to a new voice channel, and it names it according to the game you play. [P9]*

Similarly, P5, a gaming society president and a developer of a Discord bot drawing from the community and professional logic, highlighted that they added features they needed in the society server. They added features tailored to their society server and other universities' gaming societies, such as verifying student accounts and whether members paid the membership fees:

> *The other thing that has become more and more useful is the ability to use Discord bots in order to add any feature that we need to our Discord, so I actually as well as [the society] president I also project manage [the bot] which has been used by I think 40 something communities at the moment […] and a lot of societies are already using quite a few of the ones we already have available, things like verifying whether you are a student. We've got verifying whether you've paid for the membership, we've things like*

react for roles, so if you want a certain role you just do a quick reaction; it's a one-click thing and you've got access to these channels, social notifications and Twitch notifications, things like that, those kind of things that Discord doesn't have by default. [P5]

4.5 Conclusion

This chapter discusses the findings of the first empirical study that sought to answer the first research question: 1. How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use? The findings examine the relationship between the technology affordances Discord users leverage and the institutional logics they draw from. The analysis of Discord identified four types of Discord affordances – core, assistive core, innovative and assistive innovating affordances – as well as three institutional logics – community, professional and entrepreneurial logics that participants draw from. The analysis of Discord affordances and individual institutional logics did not reveal any specific patterns; thus, leveraged affordances do not seem to depend on the kind of institutional logic that informs users' behaviours. Instead, the analysis revealed a pattern that links Discord affordances with the nature of the institutional context, simple or complex social contexts, and further with the specific configurations that characterise such complex social contexts (i.e. separated or supportive). It was found that innovative and assistive innovating affordances were exclusively leveraged by participants in complex social contexts where they draw from multiple logics. The analysis also found that multiple institutional logics were enacted in configurations: the separated configuration, where participants drew from multiple logics in different social spaces at varying times, and the supportive logics configuration, where participants drew from multiple logics in the same social space simultaneously. The findings indicate that participants in the separated logic configuration have a high propensity to innovate and leverage innovative and assistive innovating affordances to develop Discord bots with niche features compared to those in the supportive configuration. This finding was attributed to the exposure of participants to the diverse and varied sources of knowledge that characterise multiple and, to an even greater degree, separated institutional logic configuration. Variation in sources of knowledge stimulated

more innovation, explaining the reliance of users in such spaces on innovative and assistive innovating affordances.

5 Chapter 5: Technological Complexity and Multiple Technologies Use

5.1 Introduction

The previous chapter presented the findings on the first research question and discussed the relationship between digital technology affordances and institutional logics, explaining how Discord is used differently in different contexts. From the analysis of the data to answer the first research question, one key observation is that participants often relied on various platforms that they used alongside Discord to achieve their goals. This observation is also supported by the analysis of secondary data, and especially Discord blogs (discussed in the Methodology chapter, section 3.4.1), which focus extensively on discussing the issues related to the integration and connection of Discord accounts with other platforms such as streaming platforms (Twitch and YouTube), collaborative platforms (GitHub and Stack Overflow) and social media (Twitter, Reddit, and Instagram). This observation prompted the second research question of the thesis: How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals? This chapter presents the findings of a second empirical study involving 21 interviews with Discord bot developers, which was conducted to address the second research question.

To answer the second research question, this chapter draws on the affordance lens to examine the affordances offered by multiple platforms and explain how and when participants perceive and leverage these affordances. This chapter is divided into three sections. The first section distinguishes between and discusses the two approaches participants follow when using multiple platforms: substitutional and complementary. The second section proposes the concept of affordance propensity to explain these two types of multiple platforms use. The last section identifies the contextual factors that affect affordance propensity and shows how these factors shape the likelihood of leveraging technology affordances.

5.2 Types of Multiple platforms Use

Multiple technologies use was defined in the literature review (Chapter 2, section 2.2.4) as the utilisation of a range of technology features by a single user to perform a task within a contemporary time. “Contemporary time” refers to the ongoing use where there is no significant time gap between the use of multiple technologies. Hence, the focus is on the collection of platforms that a single user utilises at one time rather than the platforms that the users have previously utilised. In this chapter, the concept of "multiple technologies use" is applied to examine the range of platforms users utilise relative to a primary platform. The primary platform is the platform users rely on the most in their day-to-day activities.

The first step of the analysis involved the identification of the multiple platforms that participants used alongside Discord to achieve their goals. Examples of these platforms include but are not limited to social media platforms (Facebook, Twitter, Snapchat, Reddit); messaging and communication platforms (WhatsApp, Telegram, TeamSpeak, short messaging service (SMS)); and collaborative and software development-oriented platforms (GitHub and Stack Overflow).

Once these platforms were identified, the analysis considered participants’ goals and the Discord affordances that enabled the achievement of these goals. It was evident from the data that the same goal was sometimes broken down into multiple tasks. Thus, the achievement of one goal requires the users to carry out multiple tasks. In the context of using Discord together with other platforms, five goals were identified and the analysis focused on only four goals that were most frequently reported by participants. The only goal that was not included in the analysis was organising social events because it was reported by one participant. The four prevalent goals and the technology affordances that enabled these goals are:

1. Communicating, collaborating, and exchanging information with other people. This goal was accomplished by leveraging the “interacting” affordance of multiple platforms. For example, leveraging Discord’s interacting affordance to chat with friends: “*We keep up with things that each of us are doing. So, if one of us is doing something interesting, we'll talk about it in Discord. If we find something interesting*

online, we'll share it. And sometimes we will join a call like every other week or so and then play games together and then use Discord voice chat to communicate" [R4]; and leveraging Facebook's interacting affordance to chat with the same friends: "*sometimes, if it's something urgent, we message each other on something else, like text, or Facebook or something like that. And then just use that to say like 'Hey, check Discord'*" [R4].

2. Adding new features not offered by Discord. This goal was enabled by leveraging the Discord's "developing" affordance. For instance, leveraging Discord's developing affordance to develop a reminders bot: "*So my main bot is [the bot name], which basically just does reminders. So you can type in a command, it will set up a timed message that will go off in like 10 minutes or on a certain date and time"* [R19]; and leveraging the dashboard's integrating affordance: "*And then we also have a dashboard, which is a website which has another way to control the same stuff […] But it's more user friendly in certain ways because it can be easier to do things like upload images, or files that you want to send with a reminder. Or if you want to do something like have multiple lines or large, customized content, then you can do that through the dashboard"* [R19].
3. *Answering* customers' questions and solving any problems they encounter. This goal was enabled by leveraging the "providing customer support" affordance, such as creating a support server on Discord to provide customer support: "*I use Discord for having support servers for the bots that I have made to help users using them […] So mainly it's people coming into the server asking for help like, maybe they didn't understand something, or maybe they wanted to listen out for updates or new features that I add*" [R3]; and leveraging the bot website's provision of customer support by writing documentation: "*it can get quite hectic when your bot grows because you're getting all these like thousands of people using it, so I've had to spend some time writing documentation and stuff on the website, which will help people and mean that less people come into the server because it takes up a bit of time."* [R3].
4. Solving programming problems. This achievement of the goal was enabled by leveraging the "fixing issues" affordance. For example, leveraging Discord's fixing issues by asking programming questions in Discord's developer communities: *"I'm also on a bunch of development servers for years, specifically some technologies that I use*

or some communities around development, where sometimes if I have an issue, I might just go to the server and use that search to see if a user had the same issue that I have" [R16]; and leveraging Stack Overflow's fixing issues by asking programming questions on it: *"I would always go to Stack Overflow first. I think simply because Stack Overflow's purpose is exactly for programming. So the people there, especially the ones that are answering, are actually trying to help facing that problem."* [R16].

After identifying participants' goals and the affordances they leveraged, the analysis moved to explore instances where participants mentioned utilising multiple platforms. This analysis revealed two approaches by which participants used multiple platforms to carry out different tasks, which contributed to the achievement of their goals. The first approach, which is called the substitutional use of multiple platforms, occurs when participants temporarily switch between multiple platforms for a short time and leverage similar affordances provided by different platforms to complete similar tasks and achieve their goals. Substitutional use was the prevalent approach in the data, identified in 80 instances across 20 interviewees. The second approach, which is called complementary use, occurs when participants use multiple platforms and leverage different affordances to complete different tasks that facilitate the achievement of participants' goals. Complementary use was identified in 38 instances across 16 participants. The following sections will explore the two types of multiple platforms use in greater detail.

5.2.1 Substitutional use of multiple platforms

The substitutional use of multiple platforms refers to a situation where users temporarily transition from one platform to another to complete a similar task. This transition does not entail a complete migration where one platform is abandoned and superseded by another; rather, it indicates the temporary replacement of one platform with another for a specific time to complete a similar task and users have the choice of which platform to replace. This specific time means that users switch from the primary platform they use to another platform in a specific time period to carry out a task and then switch back to the primary platform once the task is completed. Similar tasks indicate that the tasks the user intends to carry out share common elements (e.g. communicating with an audience), but there is a distinction (different audiences). For example, a user whose primary communication platform is Discord uses it to

communicate with friends, but when they communicate with their family, they switch to WhatsApp for a period, then switch back to Discord (the main communication platform) once the task (communicating with family) is complete. The switch may take a few minutes, hours or more, depending on the time required to complete the task.

Substitutional use most commonly involves two goals: (1) communicating, collaborating and exchanging information with others; and (2) solving programming problems. Table 5.1 presents the instances of multiple platforms use across the different categories of participants' goals.

Table 5.1. Multiple platforms use and participants' goals.

Participants' Goals	Substitutional Use	Complementary Use
Communicating, collaborating and exchanging information with other people	42	8
Add new features to Discord	0	12
Answering customers' questions and problems	1	16
Solving programming problems	23	0

When making substitutional use of multiple platforms, participants leverage similar affordances provided by multiple platforms to carry out similar tasks. Substitutional use involves, for instance, the transition between different communications platforms to talk to different groups of people, such as switching between Discord, Slack and Teams at different times, and it requires users to leverage their interacting affordances to carry out similar tasks: chatting with friends on Discord and communicating with co-workers on Slack or Teams:

> Generally, I hang out with my friends, as a casual user in my 10- to 20-person servers, and I am just on a call playing games with my friends or chatting about normal stuff [...] I have to go from Discord when I am using it with my friends, and I have to use Slack for work chats, and we also use Teams for calls, so I'm always using these different platforms. *[R1]*

There were a number of explanations as to why participants engage in substitutional use. Some participants reported that they often transition between multiple platforms due to pressure from their social network, who might use platforms other than Discord. R18 maintained:

> I hate Messenger, but I just use it because it's a tradition in my college, and everybody in college is using Messenger, so I just have to adapt. *[R18]*

Other participants switch between multiple platforms because of pressure from work where the use of a particular platform other than Discord is mandatory:

> I use Slack for my actual daytime work, but I just use it because we have to. *[R12]*

Participants also transition between multiple platforms for privacy reasons to communicate securely and use other platforms that support end-to-end encryption:

> I use it [XMPP] less frequently than Discord, but one thing that I do tend to use it for is private chat because it has end-to-end encryption. *[R13]*

Finally, participants mentioned that they use other platforms as a backup to Discord when it goes down:

> Discord can be unreliable, so I have to have the others [WhatsApp and Messenger] as a backup *[R4]*

Table 5.2 presents a few cases from the data exemplifying the substitutional use of multiple platforms with Discord.

Table 5.2. Examples of substitutional use of multiple platforms

Goals	platforms	Discord	Other Platform	Representative Quote
Communicate with Other People	Discord & Cal.com*	**Task**: talk to friends and relatives (casual communication) **Features**: voice and video calls **Affordance**: the possibility to interact	**Task**: talk to business associates (professional communication) **Features**: voice and video calls **Affordance**: the possibility to interact	"[Discord] I feel like only to really talk to friends and relatives at this point […] I only use it [cal.com] for business meetings. So if someone wants to reach out to me for anything, whether it's a proposal for work or if someone like an old friend wants to catch up, and I know him from a business relationship. Then I send them this link to schedule something into my Work calendar" [R12]
	Discord & WhatsApp	**Task**: talk to friends **Features**: voice, video and text chat **Affordance**: the possibility to interact	**Task**: talk to family **Features**: voice, video and text chat **Affordance**: the possibility to interact	"Just to stay in contact with a few friends that I made online, so that's what I use Discord for now […] I would say that WhatsApp is more professional, so like in more family. Like if I want to chat with my family, I'm going to go on WhatsApp first because they don't use Discord but also because the general look and feel of WhatsApp is more sober and professional, so I think it's more adapted to professional and family uses" [R18]
Solving Programming Issues	Discord & search engines	**Task**: ask programming questions in Discord's developer communities **Features**: Discord search & text chat **Affordance**: the possibility to fix issues	**Task**: ask programming questions in search engines **Features**: Google search **Affordance**: the possibility to fix issues	"We do often usually do a Google search before we just ask something on the Discord developer community, but if there's something that's really kind of a problem or that we weren't able to find an answer for very quickly or we just have a general question, want to ask about how to do something properly, and you want to talk to a human about it. Then going into the Discord bot developer groups is good for that" [R6]
	Discord & Stack Overflow	**Task**: ask programming questions on Discord servers **Features**: Discord servers and text chat **Affordance**: the possibility to fix issues	**Task**: ask programming questions in Stack overflow **Features**: question form **Affordance**: the possibility to fix issues	"Stack Overflow is a common thing for developers to use with the questions they ask for. Sometimes, a question can't be found online because your issue is very niche, and no one asked it before, so when that happens, I spend some more time trying to fix it myself. If I can't fix it myself, then I'll try and find a community where I can ask. So maybe the library which I'm using or framework maybe they have a support server [on Discord] that I can join and ask similar questions about it" [R3]
*cal.com is an open-source calendar scheduling platform that offers video conferencing functionality				

5.2.2 Complementary use of multiple platforms

The complementary use of multiple platforms refers to a situation where users use multiple platforms in conjunction to achieve their goals. In complementary use, the achievement of goals requires the completion of different tasks. Complementary use involves a relationship between multiple platforms where users can choose to use these platforms simultaneously to complete different tasks. Here, users leverage multiple platforms to combine their best features, enhancing their ability to achieve their goals. Complementary use is thus a user choice, not a requirement, in that users can have the possibility to use only one platform to perform a task, but make a choice to use multiple platforms simultaneously. Unlike the substitutional use that involves using multiple platforms separately on different occasions, simultaneous use implies that multiple platforms are used concurrently in the performance of a task. The complementary use of multiple platforms was less common than the substitutional use in the data. Complementary use was prevalent in pursuing two goals: adding new features to Discord and answering customers' questions (see Table 5.1).

In the complementary use of multiple platforms, users leverage different affordances provided by multiple platforms to complete different tasks. One illustration of the complementary use of multiple platforms is when users rely on Discord and other communication platforms to talk to other people. For example, one participant clarified how they simultaneously leverage Discord's content-sharing affordance and TeamSpeak's interacting affordance to communicate with friends. They carry out two different tasks to communicate with friends: screen sharing content on Discord and joining voice calls on TeamSpeak. They argued that they combined the use of Discord and TeamSpeak because TeamSpeak has better voice quality than Discord:

> *Whenever I'm on a call with my friends, sometimes we use TeamSpeak instead of Discord's voice chat. So we'll use TeamSpeak for audio because it's got better audio quality, and then we'll use Discord for screen sharing. [R4]*

The complementary use often manifests in the data in two situations. The first is when users perceive the affordance of one platform as limiting their actions. The second is when users perceive an affordance as missing from one platform and available on another. The majority of the complementary use instances occurred when users perceived the affordance of one

platform as limiting (13 instances compared to 8 instances when the affordance is perceived as missing).

Regarding the first situation, users perceived the affordance of one platform as limiting in the sense that it was insufficient to achieve the goal. Consequently, users choose to combine the affordances offered by multiple platforms. For example, a few participants reported using Discord to interact with other people, especially when collaborating with other developers on projects. This interaction occurs through various means, including voice calls, text chat, screen sharing and sharing files. Discord has features such as voice and video calls, text chats and screen and file sharing that enable various means of interaction. While interacting on Discord, some participants come across a situation where they need to share large files such as designs or code files. Discord provides the ability to share files, but it has a file size upload limit of up to 8 megabytes per file. Participants perceived this restriction on file size as limiting the file-sharing affordance offered by Discord. As a result, they leveraged the file sharing affordances offered by file hosting platforms, including Google Drive, OneDrive and Dropbox, that enable them to share larger files. Thus, participants carried out two tasks to interact with co-developers: communicating with co-developers by leveraging Discord's collaborating affordance and sharing large files by leveraging other file hosting platforms' file-sharing affordance. In this case, they simultaneously combined the affordances of Discord and file hosting platforms to interact with other developers. R21 stated:

> *My main issue with Discord, it is a little issue and it is fixable, is the file limit when you're trying to send files to people […] there has been a few times where I'm like, 'Oh, I am just sending this file quickly', it doesn't send […]. But in an instance where a file is too large to send on Discord, what I would then do is go out of my way and send it via OneDrive or WeTransfer or something like that, which is fine and it works, it's just inconvenient and not a nice way of doing it. If I'm talking to my developer on Discord and they say 'Oh, here's the design, what do you think of it?' and it doesn't send, it's inconvenient. [R21]*

The second situation where complementary use of multiple platforms occurs is when the affordance required to achieve the goal is missing from the primary platform users are using and available on another. In such a situation, users carry out different tasks and leverage different affordances offered by multiple platforms to achieve their goals. This situation was frequently noted when participants were leveraging Discord's developing affordance, which allowed them to utilise Discord's API feature to develop Discord bots that can add new

features, which Discord does not offer. This was also mentioned with regard to other examples. These bots often provide unique features and functionalities by incorporating other platforms' affordances with Discord. One example of complementary use to incorporate missing affordance is a participant's development of a Discord bot that enables Discord server admins to create and manage ban appeals. These ban appeals comprise forms filled out by community members who have been banned from a Discord server so they can appeal their ban in an attempt to have it overturned. Since Discord does not offer the possibility to create ban appeals, the participant utilised their bot's website to create and manage ban appeal forms. They developed a Discord bot that will send messages to banned members notifying them of their ban and the option to appeal the ban. If banned members wish to appeal, the bot will redirect them to the bot website, where they can fill out appeal forms, and the bot will send the forms to a Discord channel where server admins can approve or deny the appeal. Therefore, to develop a Discord bot that creates ban appeals, the participant leveraged the affordances of two platforms to complete two different tasks: utilising Discord's API feature and leveraging its developing affordance, while also connecting the website's data to the bot and leveraging its integrating affordance. R20 described the process:

> *If you're, let's say, removed from a server for breaking the rules, you would have to either find one of the people who work in that server as a volunteer moderator or some other way to contact them to request to be unbanned later on, or if you were wrongly banned. So what a few people started doing is they would make a Google form and that was okay but it's off of Discord, it's outside of the platform, so it's kind of difficult to use. So one of the features that we have is when you are banned from a server if you have it enabled, the bot will send you a direct message saying you were banned from whatever for this reason. And there's a button on that where you can click 'I want to appeal' […]. We allow people to create a form on our website that the bot will send them from Discord and it's all linked together with their account. So when it is submitted, it shows the server admin what the person was banned for and who banned them. So it's a lot more integrated with the bot and then with Discord as well. [R20]*

Table 5.3 provides illustrative examples of complementary use of multiple platforms when the affordance is perceived as limiting or missing.

Table 5.3. Examples of complementary use of multiple platforms

Goal	Platforms Used	Discord Affordance	Limiting Affordance	Other platform Affordance	Representative Quote
Complementary use for a limiting affordance					
Answering Customers' Questions	Discord & the bot website (documentations)	**Task**: answer users' questions and solve their issues **Feature**: Discord server & text chat **Affordance**: the possibility to provide customer support	The possibility to store FAQs and tutorials in an organised and easy-to-navigate way	**Task**: store FAQs and guides **Feature**: store information **Affordance**: the possibility to store FAQs and tutorials in an organised and easy-to-navigate way	"So some people like the documentation. They like to be able to read through a quick start guide type thing. And also, what it does for us is when we're supporting people, firstly, we get less people through because they can find an answer online themselves. Secondly though, a lot of people come through; they're asking a similar sort of question […]. So having this documentation, what we can do is, if someone comes in and asks that question, rather than having to type out the answer every time, we can basically just send them a link to that perfectly worded article that is illustrated with images and things. And that's good because it gives them the same level of support" [R21]
Communicating with Other People	Discord and file hosting platforms	**Task**: socialise with friends **Feature**: text, voice and video chat **Affordance**: the possibility to interact with friends	The possibility of sharing large files	**Task**: exchange files with others **Feature**: store files **Affordance**: the possibility of sharing large files	"I use it [Discord] for socialising with my university friends […]. Discord's file upload size is quite low. Sometimes you can't send a file because you'll reach the Discord limit, so you can either buy Discord Nitro to increase them, which depends on you, or you might not want to do that, so there are other websites like Google Drive or Dropbox to upload files and then send the link to my friend. And then you can download it off that website instead of through Discord" [R3]
Complementary use for missing affordances					
Goal	**platforms used**	**Discord affordance**	**Missing affordance**	**Other platform affordance**	**Representative Quote**
Adding New Features to Discord	Discord & third-party website	**Task**: develop a bot that displays character information in Discord channels **Feature**: Discord API **Affordance**: the possibility to develop a	The possibility to create, store, modify and integrate character sheets	**Task**: integrate the website's character sheets into the bot **Feature**: store and share information **Affordance**: the possibility to create, store, modify and	"And we wanted to recreate the shared experience of being able to see everyone rolling and everyone doing their thing [...]. The next thing was character sheets. So I actually didn't implement any character creation in [the bot] itself. There are other people that have made websites to create your characters online. So the first one that I learned about was called [website]. I didn't create [website]. Someone else did it. And I think the developers were like hey, it'd be cool to make it that [the bot] could pull down character information from that website, and then we started to work together to

Goal	Platforms Used	Discord Affordance	Limiting Affordance	Other platform Affordance	Representative Quote
		bot that shows characters' information		integrate character sheets	integrate these technologies so that people could create their character [on the website] and then [the bot] can import it" [R9]
Collaborating with Other People	Discord & Clockify	**Task**: talk to other developers when working on projects **Feature**: text, voice and video chat **Affordance**: the possibility to Interact with other developers	The possibility to track time spent when collaborating	**Task**: track the time spent when working on other people's projects **Feature**: time tracker **Affordance**: the possibility of tracking time	"So I've done work for other people on Discord. So one of my friends runs a bot, and I do development work for him. So I guess I use Discord, and then alongside, we use something called Clockify, which is just a time tracker. So it's just to track how many hours I've worked on stuff" [R19]

5.3 Patterns of Multiple platforms Use and Affordance Propensity

The second step of the analysis focused on exploring the reasons for the complementary and substitutional use of multiple platforms. Based on an in-depth examination of the instances of complementary and substitutional use that were identified, it was apparent that participants were involved in a process of comparing and evaluating multiple platforms' affordances. Where multiple platforms offer a wide range of affordances, participants tended to leverage one platform affordance over others. The notion of propensity was proposed as a potential concept that might capture this phenomenon. As discussed in the Methodology chapter in section 3.5.2.3, "propensity" refers to the inclination or tendency towards a specific action. Affordance propensity can thus be defined as the likelihood of leveraging a technology affordance to perform a task. Affordance propensity describes the relationship between a user and a technology affordance. Conceptualising this relationship benefits the analysis by providing insights into users' choices on affordances and decision-making processes.

The analysis identified three main dimensions of affordance propensity that represent the basis for the likelihood of leveraging one technology affordance over another. These dimensions are relative effectiveness, relative normativity and relative recognition. The dimensions are relative as they involve comparing and evaluating the affordances of multiple platforms. Table 5.4 shows the instances where affordance propensity dimensions were noted in relation to the substitutional and complementary use of multiple platforms. The numbers in Table 5.4 refer to the instances where each dimension was identified, and the percentages denote the proportion of each dimension in relation to the total instances for each type of use. For example, relative effectiveness accounted for 45% (36 instances) of the total instances of substitutional use (80) and 41% of the total instances of complementary use (15). These numbers and percentages were used to identify the patterns, which was followed by an in-depth examination of the data to verify the patterns.

Table 5.4. Affordance propensity dimensions and multiple platform use

Dimensions	Substitutional Use (80 instances)	Complementary Use (36 instances)
Relative Effectiveness	36 (45%)	15 (41%)
Relative Normativity	30 (37%)	1 (2%)
Relative Recognition	2 (2%)	7 (19%)

The following three sections investigate each of these three dimensions and their relationship with the types of multiple platform use in greater depth.

5.3.1 Relative effectiveness

The most common dimension identified in the data is relative effectiveness. Relative effectiveness refers to the user's assessment of the superiority of the affordance of one platform compared to the affordance of other platforms. Relative effectiveness involves a pragmatic assessment of the affordances of multiple platforms in relation to the achievement of users' goals. Thus, users leverage the platform affordance that best suits their needs. For example, consider two image editing softwares: Paint (a tool bundled with Windows) and Adobe Photoshop. Both offer the affordance of editing images. However, Adobe Photoshop may be considered better than Paint because it has superior features such as the wide range of filters and the support of a variety of image file formats compared with Paint. Table 5.5 presents some examples of the relative effectiveness from the data.

Table 5.5. Relative effectiveness examples

Description	Representative Quote
Assessment of the superiority of one platform affordance in relation to the achievement of a particular goal compared with the affordances of other platforms	"I think the biggest thing for me is that GitHub feels more like email than it does to a chat. So you won't get a response right away […]. I don't really like not being able to know whether I'm going to get an answer soon or not, which with Discord, you see they're online, you sent a message, you see that they're typing, all the info I need to ask them" [R12] "Discord voice quality is a lot better. I have a Blue Snowball microphone and turned up the bit rate on Discord. So the call quality is a lot better, especially when I'm playing a game […]. So it [Discord] integrates the best, and it has the best call quality for my daily use of gaming" [R14] "And then we also have a dashboard, which is a website which has another way to control the same stuff [on the bot] […]. It [the dashboard] basically does everything the bot does and a little more. So it's just a way of controlling the bot, pretty much. But it's more user-friendly in certain ways. Because it can be easier to do things like uploading images or files

	you want to send with a reminder. Or if you want to do something like have multiple lines or large, customised content, then you can do that through the dashboard, which is not available through the commands [on Discord] because it's too difficult to make that a good user experience with commands" [R19]

The analysis revealed that relative effectiveness is the dimension that most commonly explains both substitutional and complementary use of multiple platforms (see Table 5.4). As shown in Table 5.4, almost half of the instances of both substitutional and complementary use are accounted for by relative effectiveness, which means that when participants judge one platform affordance to be superior to another platform affordance to achieve their goals, they are likely to either use multiple platforms substitutionally (at different times) or complementarily (simultaneously). One possible explanation for the prevalence of relative effectiveness with substitutional use is reliance on platforms that are more effective at carrying out a specific task than other platforms. For example, transitioning from Discord to Telegram to communicate securely with other people as Telegram supports end-to-end encryption. Similarly, relative effectiveness is a prominent dimension that explains complementary use because when users perceive the affordance of the primary platform they are using as missing or limiting to carry out a certain task and the affordances of other platforms as more effective, they combine these affordances to complete different tasks to achieve their goals. For example, complementing Discord's interacting affordance with Google Drive's file sharing affordance to communicate with other people.

The data shows that participants evaluated the superiority of one platform affordance over another in different ways. The first instance is when one platform affordance is faster at achieving users' goals than other platform affordances. This makes users more likely to leverage the affordance to achieve their goals faster. This case is illustrated well when participants experience programming issues. A few participants reported that they often face programming issues relating to developing their software, such as coding errors, bugs and difficulty applying certain functions to their software. These issues might arise from a lack of experience and knowledge of the specific programming language they are using. In these situations, participants usually seek help from other experienced developers by asking them programming questions on Discord's development communities or posting questions on

Stack Overflow. Thus, both Discord and Stack Overflow provide the solving issues affordance. However, some participants contended that on Discord they can get answers to their questions quicker than on Stack Overflow due to the nature of the interaction between users being different on the two platforms. As Discord is a chatting platform, the interactions are synchronous and happen in real-time by posting questions in the text chat and receiving instant responses. On the other hand, as Stack Overflow is a question-and-answer platform, interactions are asynchronous, where people post questions and wait for others to see and reply to their posts and answer their questions. In such cases, participants leverage Discord's solving issues affordance because it can support them to achieve their goal (i.e., solve programming problems) faster than Stack Overflows. R15 explained:

> *Stack Overflow takes a couple of hours or even days to get a response. Sometimes it's very hard for people to even find your question. Whereas Discord is kind of instant. Like, when I ask a question, there's usually someone there to answer it. If there's not, then that means people usually don't have an answer to my question, but it's a much faster way to get a response. So, I prefer it much more than other options. [R15]*

Another way that relative effectiveness was exhibited in the data was when one platform's affordance was easier to leverage for users to achieve their goals. Hence, this made users leverage the affordance that they found easier to access. For example, when users have a group of people on multiple platforms and they leverage one platform affordance because it is easily accessible to them. R10 described how they leverage Discord's interacting affordance over other social media platforms because they spend most of their time on their computer, which has Discord installed, so it is convenient to leverage Discord's affordance when talking to other people who already have Discord:

> *Discord is mainly if wanting to call someone that already has Discord. I usually call them on Discord and speak there, because, being a developer as well, I'm pretty much on my computer most of the time. So Discord is probably the easiest one for me to use. Just because it's convenient. [R10]*

Finally, relative effectiveness was also assessed by participants when the quality of one platform's affordance was better than other platforms' affordances. The quality of one platform's affordance can be better than other platforms' affordances due to the features that enable it. For instance, the quality of the video call feature on Discord might be perceived as better than the video call feature on Instagram, making users leverage Discord's interacting

affordance. When asked what makes them use Discord to communicate with other people, one interviewee responded that:

> *I probably still use Discord because they have their mobile app, but Instagram I've seen, and I've also experienced, that their video quality tends to suffer a lot on video calls. And also just regular uploads, regular posts, the quality is kind of bad. [P11]*

5.3.2 Relative normativity

The second most common dimension was relative normativity. Relative normativity refers to whether one platform's affordance is aligned with users' norms compared to other platforms' affordances. Relative normativity involves a normative judgement of one platform affordance based on the established values, norms and expectations of the context in which the platform is used. For instance, users might leverage Slack's interacting affordance at work because it is mandatory to use this for work-related communication, while they may leverage Discord's interacting affordance to talk to friends who use Discord. Table 5.6 provides examples of relative normativity from the data.

Table 5.6. Relative normativity examples

Description	Representative Quote
Users' assessment of one platform's affordance based on its alignment with their norms and values compared to the affordances of other platforms	"I'll use Zoom or something if I'm talking to people that don't have Discord. But in terms of text messaging, normally I use Snapchat. That's my go-to, not because I want to use Snapchat. Personally, I absolutely hate it. I think it's an awful app. But because everybody else uses it, I've sort of got to" [R21] "I guess I use Slack for my actual daytime work, but yeah, I just use it because we have to" [R12] "Instagram, honestly, I'm not sure. It's mainly because my friends use it, so I kind of have to use it too" [R15]

Relative normativity was mainly associated with the substitutional use of multiple platforms (see Table 5.4). This suggests that in the context in which multiple platforms exist, when users judge one platform's affordance to be more aligned with their values and norms than the affordances of other platforms, they are more likely to move to that platform and leverage its affordance to achieve their goals.

Relative normativity was exhibited in the data when users were conforming to the prevalent norms and expectations in interacting with different groups of people. For example, some participants have friends and acquaintances who exclusively use certain communication platforms. To stay in contact with them, they switch between these different platforms and follow the norms. R17 described how they switch between Discord, Telegram and iMessage to communicate with different groups of friends and follow the norms and standards of communication among all their friends:

> *I have some friends that prefer using Telegram or iMessage over Discord or where they don't have a Discord account for whatever reason, and they're like 'I don't want to create a Discord account'. And if there's someone that I'm willing to take my time to converse with them, I'll switch platforms for a little bit to talk with them. [R17]*

Similarly, some users leverage one platform affordance that fits with the norms of a specific context. For example, participants leverage Zoom's interacting affordances for work-related communication. R1 stated that he only used Zoom for work or for friends who do not have Discord:

> *Usually, I don't need to use Zoom I really only ever use Zoom for work or for the friends that won't get on Discord, and that's it, that's not like a daily thing. [R14]*

5.3.3 Relative recognition

The final and least common dimension identified is relative recognition. Relative recognition refers to the popularity of one platform's affordance compared to other platform' affordances. It involves the cognitive aspects, in particular knowledge about one platform's affordance based on past experience of leveraging that platform's affordance (i.e. familiarity). Take the example of sending emails. Both Gmail and Outlook offer the same possibility of sending emails and one user might be proficient in using both services. However, this user might choose to send emails through Gmail because they have been using it for years. Relative recognition does not necessarily entail a conscious judgment. Instead, the affordance of one platform is taken for granted due to prior experience or popularity, or when the idea of using another is inconceivable. In contrast, the other dimensions assume the user engages in a conscious process of evaluation of the affordances relative to one another. Relative

effectiveness involves assessment as to which affordance is best suited to meeting users' goals, and relative normativity includes an assessment as to which technology is aligned with users' norms. Table 5.7 highlights some examples of the relative recognition dimension from the data.

Table 5.7. Relative recognition examples

Description	Representative Quote
The popularity of one platform's affordance compared to the affordances of other platforms	"…a lot of the time when we chat on Instagram it's usually because maybe someone shared a post from Instagram or shared like an Instagram reel from Instagram. So it's more kind of intuitive to chat on there" [R15] "…what I would do is take the problem I'm having and kind of Google it. And a lot of the time, there are websites like there's one called Stack Overflow, which is just basically a forum like an old-style forum, where people will post the problems they're having. And then when they fix it, they'll post how and mark that as an answer" [R20]

The data in Table 5.4 suggests a potential relationship between relative recognition and the complementary use of multiple platforms. This suggests that in the context in which multiple platforms exist, when users are using a platform that lacks a particular affordance or they perceive it as limiting to achieving their goals and are familiar with the affordance of other platforms, they are more likely to use both platforms in conjunction and leverage their affordances to achieve their goals.

Recognition of one platform affordance appeared in the data when users were familiar with one platform affordance. This was exemplified by one participant whose task was to develop a Discord bot showing video game statistics (e.g., playtime, level, experience points and win/loss ratio) inside Discord channels, which is an affordance not offered by Discord. Given that the participant was familiar with a third-party website that offers the possibility of showing and sharing such statistics with Discord due to its popularity, as described by the participant who referred to it as the leader, they leveraged its affordance of sharing video game statistics alongside Discord's developing affordance to achieve the goal of developing a "statistics Discord bot". R16 commented that:

> *But in order to get some statistics and so on, you will usually have to go on a third-party website to check it out in our style of doing that. And I was like, there has to be a way to do this on Discord […]. I think at the time for you to get this kind of statistics, it wasn't*

very available at the game. So everyone was using these third-party websites […]. I think OP.GG has been the leader, at this time, probably not anymore, but it has been slowly throughout the years the leader. [R16]

5.4 Contextual Factors Influencing Affordance Propensity

The last step in the analysis sought to explain what impacts the likelihood of leveraging a platform affordance (i.e., affordance propensity). Through the examination of affordance propensity dimensions and multiple platforms use, it became evident that there were contextual factors that played a critical role in influencing the affordance propensity. The analysis identified three contextual factors influencing the relativity of the propensity dimensions*:* the capabilities of the platform, relevant social groups and task characteristics. These contextual factors exert an influence by increasing or decreasing the relativity of the affordance propensity dimensions, i.e., making one platform affordance more or less effective, aligned with the norms, or recognised compared to the affordance of other platforms.

To explore the influence of contextual factors on affordance propensity, a coding query was conducted between contextual factors and affordance propensity dimensions codes (as discussed in the Methodology, section 3.5.2.3). Table 5.8 shows the result of the query. The numbers in Table 5.8 illustrate the instances where each contextual factor intersects with the affordance propensity dimensions and the percentages pertain to the proportion of each factor relative to the total number of instances for each dimension.

Table 5.8. Relationship between contextual factors and affordance propensity dimensions

Contextual Factors	**Affordance Propensity Dimensions**		
	Relative effectiveness (58 instances)	Relative normativity (30 instances)	Relative recognition (9 instances)
The Capability of the platform	38 (66%)	0 (0%)	8 (89%)
Relevant Social Groups	4 (7%)	26 (87%)	1 (11%)
Task Characteristics	16 (27%)	4 (13%)	0 (0%)

The next three sections will examine these factors in more detail.

5.4.1 The capabilities of the platform

The first and most prevalent factor influencing users' likelihood of leveraging a platform affordance was the capabilities of the platform. The capabilities of the platform refer to the platform's capacity to perform a task. The capabilities of the technology are shaped by the features and functionalities of the platform. These features and functionalities define how the platform operates and thus give rise to affordances. For instance, a user might leverage Telegram's communicating affordance over Discord's communicating affordance because it is capable of conducting secure communication due to its end-to-end encryption protocol. Table 5.9 highlights some examples of the capabilities of platform from the data.

Table 5.9. Examples of the capability of the platform

Description	Representative Quote
The platform's capacity to perform a task based on the features built into it increases or decreases the likelihood of leveraging its affordance	"So I guess sometimes the [Discord] notifications when you get pings are quite inconsistent […]. Like, sometimes, if it's something urgent, we message each other on something else like text or Facebook or something like that" [R4] "The first is just the contents of the text. Discord is better for longer texts because its primarily use is on the computer. It did have a mobile app, but the majority of people use it I think, from what I've seen within my friend group, use it on the computer. So it's easier to share files and long paragraphs of text if you need to write up things, rather than texting within text messages or within WhatsApp messages, which is sort of better suited for shorthand texting communication" [R9]

As can be seen from Table 5.8, the capabilities of the platform are mostly associated with relative recognition and to a lesser extent with relative effectiveness. This pattern suggests that when users undertake a task that requires combining multiple platforms, the features and functionalities of one platform increase the relative recognition of that platform affordance, making it more likely to be leveraged. Similarly, the features that are available in one platform can make its affordance appear superior to other platform affordances and thus more likely to be leveraged.

The influence of the capabilities of the platform on relative recognition was exemplified when one participant clarified that Stack Overflow is their "place to go" for solving programming issues because it has better filtering options than Discord. Thus, Stack Overflow's ability to

filter and access topics increased its relative recognition and made its affordance more likely to be leveraged. R16 explained:

> *I would always go to Stack Overflow first. I think this is simply because Stack Overflow's purpose is exactly for programming […]. Instead of Discord, which is the place to hang out. So, it has all types of mixed content. So it's just very specific on Stack Overflow. There's a thread for that issue, and the people answering are trying to solve that issue. So it's very specific. However, on Discord, it's not focused on that. It's more of a community. And it's sometimes much harder to filter through and to get direct access to that stuff. So I'll say for sure, Stack Overflow is always a place to go. [R16]*

Situations where participants were developing a Discord bot that incorporated features from other platforms provide an example of the effect of the capability of the platform on the relative effectiveness of platform affordance. For instance, R9 developed a Discord bot that integrates character sheet information for a role-playing game (*Dungeons and Dragons* (D&D)) from third-party websites. D&D character sheets are forms that players use to track all information about in-game characters, such as name, health, abilities and statistics. These character sheets are often paper-based forms, but there are other websites that allow players who play the game online to digitally create their character sheets on their websites. As R9 explains, Discord messaging functionalities are not suited to creating these character sheets, and they integrated character sheets from third-party websites because they are better suited to storing character sheet information and editing their information. Therefore, a third-party website's affordance of storing and editing information is superior to Discord's message storage affordance, which has a text limit of 2,000 characters per message. R9 clarified that:

> *So I actually didn't implement any character creation in [the bot] itself. What it does is there are other people that have made websites to create your characters online […]. And I think the developers are like 'Hey, it'd be cool, make it that [the bot] could pull down character information from that website' […] Because the character sheets that you do on these other platforms, you have to store data for a long time. And you have to refer to it and possibly change it constantly for like hit points, inventory, other game attributes. And Discord isn't really a good platform for that because it's a lot more suited for messaging, either text messaging or sort of forum style messaging but it's not very good for long term data storage and reference […]. I guess I could write out everything [on Discord messages]. Like I could write my character's name, their hit points, their inventory, whatever. But the first limitation you'd run into is that a Discord message can only be 2,000 characters long or 4,000 if you have Nitro. So a lot of character sheets have more than 2,000 characters of text on them. So you'd have to split it into lots of different messages. And then that becomes a whole problem when you're trying to import it into your bot. [R6]*

5.4.2 Relevant social groups

The second factor influencing the likelihood of leveraging one platform affordance is relevant social groups. Relevant social groups refers to the collection of individuals involved in the use of a particular platform. Such social groups are relevant because they belong to a specific user's social network and share the use of a common platform. In the data, evidence was found that: (1) the location of relevant social groups (i.e., what platform they are using); and (2) the user's perception of the social groups involved in the use of a particular platform (e.g. "friendly versus toxic", "kind versus harsh" and "knowledgeable versus novice") can influence a user's propensity to leverage one platform affordance over another. For example, a user will likely leverage WhatsApp's interacting affordance because a group of friends use the same affordance. Similarly, a user will likely leverage Stack Overflow's fixing issues affordance because they perceive other users who use Stack Overflow to be sufficiently knowledgeable and experienced to solve their development issues. Table 5.10 provides examples of the relevant social groups' influences on affordance propensity.

Table 5.10. Examples of relevant social groups

Description	Representative Quote
The location of relevant social groups and perception of relevant social groups by other users increases or decreases the likelihood of leveraging one platform affordance	"Some of my friends I might only have on one platform. And in that case, I'll only use that platform to talk. But most of the time, I'll have my friends on every single platform" [R17] "The website that I visit probably the most when it comes to programming questions or things that I need help with is a platform called Stack Overflow. It's essentially like a Q&A forum where someone can be like, 'Hey, I have this issue. Can anybody help me out?' The only downside to Stack Overflow specifically is that it's got, unfortunately, a really toxic community." [R17]

The relevant social groups factor was mainly associated with relative normativity (see Table 5.8). There were few instances where relevant social groups appeared to explain relative effectiveness and relative recognition. This association with relative normativity indicates that when users' relevant social groups exclusively use one platform, the affordances of that platform are perceived by users as being more aligned with their relevant social group's values and standards, thus increasing the relative normativity of these affordances.

One example of the impact of the relevant social group on relative normativity is the case in which users switch between multiple platforms to communicate with different groups of people. Each group might exclusively use one platform, and participants may have to conform to the social group's norms by leveraging the affordance of the platform each group is using. R6 explained that they leverage the affordances of Slack, Teams and Zoom when communicating with people who don't have Discord and only use these platforms, even though such affordances are not their preferred choice. Thus, the location of the relevant social group in terms of the platform they are using made Slack, Teams and Zoom's affordances more normative relative to Discord's affordance because the user must conform to the social group's norm. As R6 explained:

> *I only use those [Slack, Teams and Zoom] if I'm meeting with someone who doesn't have Discord and needs to communicate for these other mechanisms. So, I have Microsoft Teams and Zoom both installed on my computer, but I only use them if I'm interacting with people who exclusively use Teams or Zoom. I also have a Slack account for similar reasons. Some people only use Slack, and I have to communicate with them there. But that's not my preferred way of doing things. [R6]*

In some cases, relevant social groups were also observed to influence the relative effectiveness of a platform affordance. The user's perception of other social groups who use one platform can make its affordance more or less effective at achieving users' goals than other platforms' affordances. For example, some participants perceived Stack Overflow's users as knowledgeable when it comes to answering programming questions and solving the user's programming issues, yet other participants perceived Stack Overflow's users as hostile or toxic, criticising people asking previously answered questions or poorly articulated questions. Therefore, if participants perceive other users of Stack Overflow as knowledgeable, this will increase the relative effectiveness of Stack Overflow's fixing issues affordance in achieving their goals. However, if participants perceive Stack Overflow's users as toxic, participants will avoid leveraging its fixing issues affordance and thus decrease its relative effectiveness in achieving users' goals. Participants mentioned three main approaches to solving programming issues in the data: (1) asking questions in Discord's programming servers; (2) searching Stack Overflow for similar issues or asking new questions there; and (3) reading documents and Wikis or tracking issues on GitHub. While all three platforms offer fixing issues affordance, the social group's perception of these platforms can make one platform affordance seem more effective relative to another. R21 argued that people on Stack

Overflow are knowledgeable and offer detailed answers to programming questions compared to people on Discord, where people provide less detailed answers. R21 conveyed that:

> *Stack Overflow is much better because you can type out your issue and attach screenshots and everything as you could in Discord. Now, it takes maybe an hour or two to get a reply, sometimes even longer than that, but the replies that you get are generally quite detailed […] they're very detailed on that. Also, they are experienced people. So, people on Stack Overflow generally know what they're doing […]. So Stack Overflow provides better quality answers, especially on programming issues, whereas Discord can provide sort of a range of views very quickly, but less detailed. [R21]*

Other participants avoided asking questions on Stack Overflow because they perceived the community on Stack Overflow as hostile when responding to programming inquiries. This hostility has made its fixing issues affordance less effective as participants hesitated to ask questions on the platform. For instance, R17 described the community on Stack Overflow as "toxic", and noted that they had a better time asking questions on Discord programming communities:

> *The only downside to Stack Overflow specifically is that it's got, unfortunately, a really toxic community. And so I remember when I wanted to ask a question on there one time, it was something that was not asked before on Stack Overflow. But when I took my question there, it was shut down within five minutes, saying, 'Oh, it's already been asked', and they linked me to these posts that had absolutely no relevance to my problem […]. When it comes to asking communities that are specifically centred around a specific programming topic, like View, the experience varies. Sometimes people are really helpful. Sometimes people are just as bad, if not worse, than Stack Overflow. It's a mixed bag, but my personal experience is that on Discord, I often have a much better time than I would asking any question on Stack Overflow [R17]*

5.4.3 Task characteristics

The last contextual factor found to influence the likelihood of leveraging platform affordance is task characteristics. This refers to the attributes of the task that users undertake. Examples of these attributes are "simple or complex" issues, "general or specific" questions, and "casual or formal" communication. For instance, when they intend to formally communicate with co-workers users might leverage Slack's interacting affordance compared with that of Discord, where they leverage its interacting affordance to casually chat with friends. Table 5.11 offers illustrative instances of the influences of task characteristics on affordance propensity.

Table 5.11. Examples of task characteristics

Description	Representative Quote
The attributes of the task to be undertaken by the user increase or decrease the likelihood of leveraging one platform affordance	"So if I have a specific question that I'd like to ask a specific person, Discord is much better for that. Stack Overflow is good when you have literally no idea and it is a programming-based question. So something to do with the databases or something which is really nothing to do with Discord" [R21] "I also use Zoom because I don't feel Discord is very professional for video calls with people other than friends […]. For other more like formal things, I use Zoom and sometimes even Google meet" [R15]

The task characteristics factor was mainly impacting the relative effectiveness dimensions of affordance propensity, with a few instances where task characteristics influenced the relative normativity dimension (see Table 5.8). This indicates that the attributes of the task to be undertaken by users can make the affordance of one platform superior to other platform affordances as it is better suited to the characteristics of the task, thus making it more likely to be leveraged.

For example, solving programming issues was frequently reported by respondents in relation to the influence of task characteristics on relative effectiveness. As described above, when respondents encountered programming problems, they could draw on three approaches to solve them. They asked questions on Discord programming communities, or they searched or posted questions on Stack Overflow and GitHub. Since all platforms offer the fixing issue affordance, the type of problem (i.e., task characteristics) can increase the effectiveness of one platform affordance. One respondent described how they leveraged Discord, GitHub and Stack Overflow's solving issues affordance based on the attributes of the problem. They explained that they leverage Stack Overflow's affordance if the problem is related to a programming language, but if the problem is related to a library or if the error is self-made, they leverage GitHub and Discord's affordances respectively. Such a case means that the task characteristic (e.g., a problem related to a programming language) increases the relative effectiveness of Stack Overflow's solving issues affordance and makes it superior and suitable for solving such problems over other Discord and GitHub affordances. When the problem is pertinent to a specific library, it increases the effectiveness of GitHub's solving issues affordance and makes it superior compared to the affordance offered by Stack Overflow and Discord. R19 explained:

> *It depends on where the problem has arisen from. Because if it's a problem that's associated with the programming language itself, then usually Stack Overflow first. If it's a problem with the library that seems more severe, then I'll go to GitHub issues. Or if it's a problem with the library that is likely an error that I have made, I'll probably go to Discord. [R19]*

The task characteristics factor was also found to influence relative normativity in some cases. For example, one respondent described how they use Discord and Slack to solve programming questions depending on the type of question they have and whether the question requires proprietary information to be disclosed about the company they work for. In the respondent's account, if the problem did not require proprietary information about the company, they asked their question on the Discord servers, but if the problem needed propriety information, they asked their co-workers on Slack. Thus, the task characteristics (i.e. requiring proprietary or non-proprietary information) can increase the relative normativity of one platform affordance (e.g. it is normative to ask questions that require propriety information on Slack rather than asking them on Discord servers). R2 explained when they use Discord and Slack:

> *It depends on what the kind of question you have is. So, for example, we are working with Salesforce at the moment at work, and we have got a problem with some data not making it into Salesforce. So, if I got an error, got a specific message from Salesforce saying this happened, or this is missing, or something like that, I probably head towards the Salesforce support server [on Discord]. Because it's the kind of question that I don't need proprietary information about my company to answer, mostly a general message, so that's the kind of thing, but if it is a specific problem in my work's code that's very unique to us, […] then I'd ask like a co-worker [on Slack] because there's a lot of proprietary information there before you can get to the answer. […] So it depends what the question is. [R2]*

5.5 Conclusion

This chapter discusses the findings of the second empirical study conducted to address the second research question: How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals? The findings reveal two approaches to using multiple platforms that Discord users drew on: substitutional use, where users temporarily switch between multiple platforms that offer similar affordances, and complementary use, where users use multiple platforms that offer different affordances in conjunction to achieve their goals. To explain when users chose one approach

as opposed to another, this chapter also introduced the concept of affordance propensity. Affordance propensity refers to the likelihood of a technology affordance that was valuable in elucidating the use of multiple platforms being leveraged. The analysis revealed three dimensions of the affordance propensity (relative effectiveness, relative normativity and relative recognition) that explained when users choose the substitutional or the complementary approach to multiple platform use. The findings show that the substitutional use of multiple platforms can largely be explained by the relative effectiveness and normativity of the affordances, while the relative effectiveness and recognition of platform affordances explains the complementary use. Finally, the analysis revealed three contextual factors that impact affordance propensity: the capabilities of the platform, relevant social groups, and task characteristics. These factors play a key role in influencing the relativity of affordance propensity dimensions and, thus, the type of multiple platforms use. Overall, this chapter provided empirical evidence on the nature of multiple platforms use in a technologically complex context by explaining how and when users leverage different platform affordances in combination or separately to achieve their goals. The next chapter will discuss the empirical findings of the first and second research questions together.

6 Chapter 6: Discussion

6.1 Introduction

Starting with the observation that the characteristics of digital technologies, in particular their openness and generativity, increase the complexity of the context in which such technologies are used, the objective of this thesis is to understand digital technology use in complex contexts. To accomplish this aim, two research questions were developed to consider the role of two types of contextual complexity in shaping digital technology use. These research questions are:

1. How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?
2. How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals?

To answer the first research question, the technology affordances lens and institutional logic perspective were combined to examine social complexity and its influence on technology use. The technology affordance lens was used to examine technology use by exploring the interaction between users' goals and technology features. The institutional logic perspective was utilised to examine social complexity. The concept of "institutional complexity" (Greenwood et al., 2011) was applied to define social complexity where multiple institutional logics influence the actions of actors. The first empirical findings examined the relationship between Discord affordances and the institutional logics that participants embraced.

The second research question addressed technological complexity using the technology affordances lens where multiple platforms offer different affordances. Technological complexity was conceptualised as the multiplicity of platforms available to users to serve their goals. The second empirical chapter explored the influence of the complexity of technological context on the patterns of multiple platforms use utilising the affordance propensity concept.

This chapter will discuss the findings of the two empirical chapters and their implications for existing research. The chapter comprises three sections. The first section summarises the findings of the first empirical chapter, explains the findings by leveraging existing literature,

and highlights the main contributions of the first empirical study on existing literature. The second section also summarises and explains the findings of the second empirical chapter and outlines the contributions that these findings bring to existing research. The final section builds on the findings of the two studies to develop a framework that captures the complexity of contexts (both social and technological) and discusses the contribution that such an integrated framework – leveraging institutional logs and the technology affordances lens to study technology use in socially and technologically complex context – offers to existing literature on technology use.

6.2 Social Complexity and Technology Use

6.2.1 Summary and explanation of the first empirical study findings

The patterns of Discord use in socially complex contexts were examined in Chapter 4. The findings of the first empirical chapter are summarised in Figure 6.1. These findings show that the complexity of the social context shapes the way users engage with Discord and leverage its affordances in that context. Firstly, the findings show that in a simple social context (the solid line box on the left-hand side in Figure 6.1) – a context characterised by a single institutional logic – users use the Discord by leveraging only the core and assistive core Discord affordances. In contrast, in a socially complex context characterised by multiple institutional logics, users utilise Discord by leveraging all types of its affordances (core, assistive core, innovating and assistive innovating affordances) (the dashed-line box on the right-hand side in Figure 6.1).

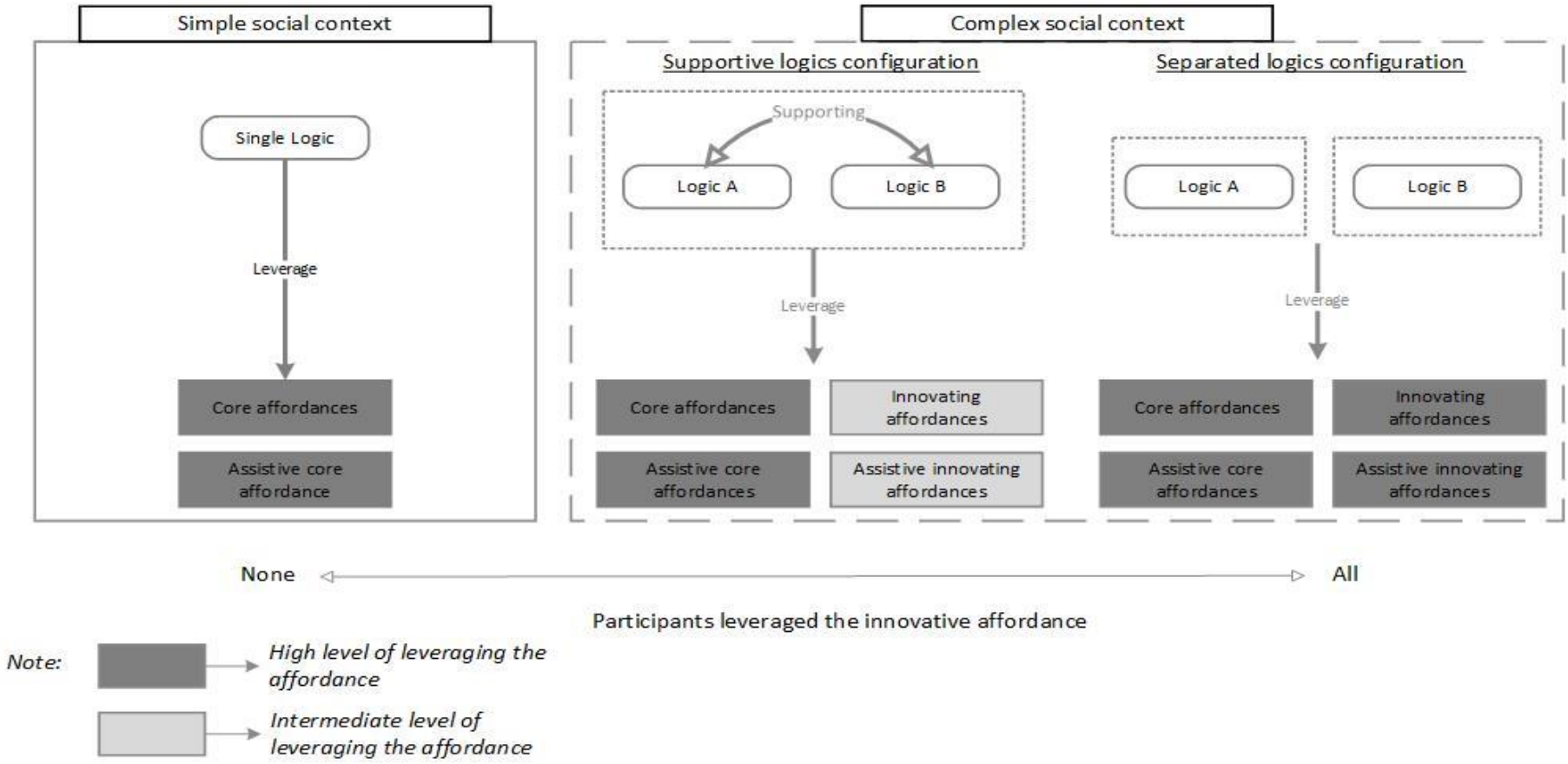


Figure 6.1. Summary of the first empirical study findings

Secondly, the findings indicate that the nature of social complexity (i.e., logics multiplicity) matters in how users utilise Discord and leverage its affordances. In socially complex contexts characterised by supportive logics configuration, only half of the users leveraged innovative and assistive innovating affordances. Conversely, in socially complex contexts characterised by separated logics configuration, all users leveraged innovating affordances, and almost all of them leveraged the assistive innovating affordances. This finding suggests that users utilise Discord as intended in accordance with its stated purpose by leveraging the core and their assistive affordances regardless of the nature of the social context (i.e., simple or complex) in which they operate. However, the innovative uses of Discord vary depending on the nature of the complexity of the social context (supportive versus separated) in which users operate, ranging from non-innovative use in a simple social context (none of the participants making use of innovative affordances), to intermediate use levels (half of the participants making use of innovative affordances) when multiple logics configuration is supportive, to high levels (all of the participants making use of innovative affordances) when multiple logics configuration is separated.

As shown in Figure 6.1, Chapter 4 has two major findings: first, it linked the multiplicity of logic with the use of innovative affordance; and second, it explained different patterns in the use of innovative affordances depending on the configuration of logic characterising this multiplicity.

First, the innovative use of Discord (i.e., leveraging its innovative affordance) is related to institutional logic multiplicity. This finding can be explained by drawing on existing findings in the institutional theory literature. Institutional theory research has shown that institutional complexity creates tensions and offers opportunities that facilitate innovation (Haveman & Gualtieri, 2017; Siltaloppi et al., 2016; Dalpiaz et al., 2016; Durnad & Thornton, 2018). Logic complexity means that users are embedded in multiple social contexts and exposed to diverse values, norms, practices and perspectives, stimulating novel ideas for innovating solutions (Jay, 2013). For instance, Dalpiaz et al. (2016) show how combining conflicting institutional logics enables organisations to envision new possibilities and innovate their product design by using multiple logics as resources to enable embedded agency. They highlight that organisations combine the normative elements of conflicting institutional logics to develop new strategies and practices that lead to novel actions and pursue new market innovations.

In the context of this research, different types of institutional logics were identified, including community, professional and entrepreneurial logics. The three logics identified are composed of different components that exhibit each logic's goals, guiding principles and practices. These components offer participants a "cultural toolkit" that provides opportunities to change existing practices (Thornton et al., 2012). This toolkit acts as institutional resources that participants utilise to combine the goals, assumptions and practices of multiple logics to generate new ideas. This combination of multiple logics elements highlights logics multiplicity as an enabler of embedded agency (Dalpiaz et al., 2016). When participants are exposed to multiple institutional scripts, this exposure triggers participants' reflexivity to challenge existing institutional practices and assumptions associated with multiple logics. Therefore, instead of passively conforming to the institutional demand of one logic (i.e., following one logic or another), participants combine perspectives and ideas from multiple institutional logics to fit their needs in a specific context, leading to innovative solutions.

A similar idea is discussed by Siltaloppi et al. (2016), who show that institutional complexity drives innovation. According to Siltaloppi et al. (2016), institutional complexity arises when multiple institutional logics offer incompatible prescriptions for actions due to the diverse elements of each logic. Such complexity manifests through dissatisfaction with the prevailing institutional logic prescriptions or when the prevailing logic does not favour the goals or interests of actors who draw from alternative logics. Thus, institutional complexity reduces the influence of the prevailing institutional logic and makes the other logic's goals, norms and practices available to actors, which can be used to create novel solutions. Therefore, institutional complexity enables actors to look beyond the prevailing institutional logic for resources that can be utilised to devise new solutions to complex situations

This influence of institutional complexity was evident in the data when some participants developed "multi-purpose" Discord bots that added novel features to Discord. As discussed in Chapter 4 (section 4.4.2), some participants were operating in multiple Discord servers and drew from multiple institutional logics within each server (e.g., community logic in the friends server, professional logic and entrepreneurial logics in the support server). One of the features that participants developed in these "multi-purpose" bots was the "reaction roles" that automatically give roles to community members. The participants realised that the process of admins manually allocating roles to community members in the gaming community

was daunting. In this case, institutional complexity enabled the participants to look beyond the community logic and utilise the practices of professional logic to develop a Discord bot that automatically grants community members roles within the community. By doing so, participants challenged the existing prescription of the community logic (manually giving away roles) due to their dissatisfaction with the logic's practices, and they applied the knowledge they acquired from the professional institutional logic to solve the problem. Such institutional complexity provided participants with a toolkit to integrate elements from multiple institutional logics to create novel solutions to the problems at hand; as a result, they developed Discord's "reaction roles" bots

Second, the analysis in Chapter 4 finds that the relationship between multiple logics at play (i.e., the configurations of multiple logics) matters in explaining the innovative use of Discord. Participants operating in the separated logic configuration have a higher propensity to engage in innovative use of Discord than those operating in the supportive logic configurations. This finding can also be explained by drawing from existing findings in the innovation studies, which show that diversity in human capital (Protogeroua et al., 2017), employee composition (Ostergaard et al., 2011), the top management team (Talke et al., 2011) and knowledge sources (Leiponen & Helfat, 2010) are key drivers of innovation. For example, Protogeroua et al. (2017) examine the effect of diverse founders and workforce human capital (i.e., educational and professional background, professional experience and skills) on a firm's innovation performance. They find that heterogeneity in team members' experience offers a diverse stock of knowledge and expertise that results in a cognitive conflict, which is beneficial for firms to promote open debates on ideas and enables the discovery of innovative solutions. They also show that the diversified professional background of firms' founders suggests access to a wide array of practices and norms based on different experiences, which leads to a higher tendency to produce innovation. Similarly, Ostergaard et al. (2011) show that the more diverse the employee composition (gender and educational background), the more likely the firm is to innovate. They argue that diversity in employee composition implies diversity in knowledge sources that improve the firm's learning by having different points of view and experiences, which facilitate the generation of new ideas. In their study of the effect of top management diversity on innovation orientation, Talke et al. (2011) highlight that top management diversity in terms of educational backgrounds and experiences leads to a variety

of perspectives and knowledge, which leads to more innovative solutions. Talke et al.'s (2011) study suggests that top management relies on different cognitive frames to make decisions, and these frames are largely developed by educational and functional backgrounds, experiences and values that facilitate a proactive innovation orientation.

The impact of diversity on enhancing innovation performance, orientation and outcomes is a central discourse within innovation studies (Ostergaard et al., 2011). The core argument is that diversity enables access to a wider knowledge bases that cultivate different points of view, opinions, experiences and ways of thinking that can be exploited to stimulate novelty (Miettinen, 2006), creativity (Tang & Ye, 2015; Fischer, 2005) and innovation (Leiponen & Helfat, 2010). In the context of the first empirical study, and as described in Chapter 4 (section 4.4.3), a key distinction between separated and supportive logic configurations is the social space (i.e., Discord servers) where users draw from multiple logics. In the supportive logic configuration, users operate within the same Discord server and draw from multiple institutional logics, whereas the separated logic configuration involves users drawing from multiple institutional logics in distinct Discord servers. Each Discord server represents a social space comprising varied groups of members with different experiences and backgrounds and offering users access to diverse sources of knowledge. Such diversity in server members contributes to knowledge base diversity where different individual knowledge comes into play and, through their interactions, different members develop, discuss and recognise novel ideas that promote innovative behaviours (Ostergaarda et al., 2011; Mannix & Neale, 2005). Such novel ideas do not occur in isolation in individuals' minds; instead, they result from ongoing interactions between individuals and their socio-cultural context (Fischer, 2005). Through interaction and communication with other people, users exchange knowledge and the more diverse the people they interact with, the more diverse the sources of knowledge they access and the more likely it is that innovative behaviour will occur.

The findings show the impact of diversity of knowledge sources on novelty and innovation. For instance, the degree of novelty of the Discord bot features developed by participants varies between separated and supportive logic configurations. As shown in Chapter 4 (section 4.4.3.3), most participants operating in the supportive logic configuration developed "multi-purpose" Discord bots. These bots offer many features, often generic features such as reaction roles, moderation tools and music playback. In contrast, participants operating in the

separated logic configuration developed Discord bots that offer novel and niche features not found in other bots, such as temporary voice channels, verifying students' accounts, mod log, and Scrum bot with Jira integration. These participants in separated logic configuration operate in multiple separated Discord servers and thus have access to wider knowledge sources that enable them to use diverse cultural resources to develop novel features for their Discord bots. Thus, the bots developed by participants in the separated configuration were more novel because participants had access to diversified knowledge sources where such bots were developed for specific contexts or audiences and then rapidly diffused due to their novelty. This finding aligns with Miettinen's (2006) observation that individuals' interactions and collaborations in diverse cultural contexts are a key source of novelty as individuals acquire and utilise different cultural resources and knowledge that lead to novel ideas.

6.2.2 Contributions

The findings from the first empirical study make several noteworthy contributions to existing research on technology use, particularly to research bridging the institutional logics perspective and technology affordances lens to explain technology use and, more broadly, to research on technology affordances.

The first and most important contribution of this thesis is explaining the relationship between the configuration of multiple institutional logics and technology affordances. Research on institutional complexity calls for going beyond the individual analysis of institutional logics multiplicity to examine how multiple logics manifest in practice (Besharov & Smith, 2014; Reynard, 2016). However, existing research combining institutional logics and technology affordances examines the relationship between specific logics and affordances individually, even when examining technology use in contexts characterised by multiple institutional logics. Such research has either associated certain affordances with specific institutional logics (.e.g., Hultin & Mähring, 2014; Faik et al., 2020; Oborn et al., 2021; Oostervink et al., 2016) or, less commonly, it has associated certain actors with specific logics (Bunduchi et al., 2020) (generally depending on their job role) and associated these logics with particular affordances (e.g., Seidel et al., 2016). The thesis shows that the examination of the relationship between individual logic with technology affordances did not explain technology use, instead, in the case of Discord, technology use is explained by considering the configurations of multiple

logics that characterise social contexts. The configurational analysis (the analysis of configurations of logics and configurations of affordances) in this study highlights how technological and institutional affordances interact and shape technology use (Nambisan et al., 2019). The two types of logic configurations represent micro-institutional affordances (van Dijk et al., 2011) that enable users to draw on multiple logics within the same space (supportive configuration) and in different spaces (separated configuration). The findings suggest that the users operating in separated logic configurations have a higher propensity to leverage Discord's innovating affordances than those operating in the supportive logic configuration. Thus, the analysis offers an alternative approach to that used in existing research for examining the relationship between institutional logics and technology affordances based on the configurational analysis that may reveal new insights into understanding technology use, which may not be possible to discern by looking at the individual relationship between logics and affordances.

The second contribution of the findings is to research embedding technology affordances as a component of institutional logics. Faik et al. (2020) developed an affordance-based institutional perspective as an approach to study technology use by examining the relationship between logics and affordances. They propose technology affordances as a component of institutional logic, meaning that when users draw from one institutional logic, they only leverage the technology affordance that corresponds to that logic, or when the affordance associated with one logic is leveraged, the institutional logic becomes prevalent and activated. The findings of this research suggest that users leverage the same affordance when drawing from different institutional logics. For instance, participants who exhibited all logics leveraged the interacting and organising affordances that constitute Discord's core affordances. Therefore, Faik et al.'s (2020) assumption of treating technology affordances as a constituting element of logic does not seem to hold in the context of Discord. One possible explanation for this might be that Faik et al. (2020) identify technology affordances based on a review of affordances literature examining technologies within organisational settings such as enterprise resource planning or electronic patient records. In the context of Discord and perhaps other digital technologies, characterised by openness and generativity, this affordance-based institutional perspective does not seem to work. This finding suggests the

importance of future research to consider the characteristics of digital technologies that affect the explanatory power of existing theoretical frameworks.

Third, the findings contribute to the body of literature on technology affordance by adding a new form of relationship between affordances: the supportive relationship. Prior research on technology affordance delineates different types of relationships between affordances, including nesting, sequentiality (Gaver, 1991), dependency (Strong et al., 2014), collectiveness (Leonardi, 2013) and networks (Burton-Jones & Volkoff, 2017). In this study, Discord's assistive affordances reflect a supportive relationship with the core and innovative affordances as they facilitate leveraging the core and innovative affordances. This means that assistive affordances are not constituents of the core or innovative affordances (nesting), nor does it not mean that leveraging them leads to leveraging the core or innovative affordances (sequentiality) or vice versa (as per Gaver, 1991). It also does not mean that leveraging the core and innovative affordances depends on leveraging the assistive affordance (dependency) (as per Strong et al., 2014), or that they must be aggregated to leverage the core or innovative affordances (collectiveness or networks) (as per Burton-Jones & Volkolf, 2017; Leonardi, 2013b). Instead, assistive affordances enhance and support the core affordances of the technology without being indispensable to their actualisation. The findings showed, for example, that when participants leveraged the visibility affordance (core-assistive affordance), it enabled them to see other people's actions and messages and make actions and messages visible to others, which increases interactions and, as a result, reinforces the interacting affordance. Similarly, when participants leveraged the fixing issues affordance (innovating-assistive affordance), it enabled them to fix programming issues they encountered when developing their bots, which enhanced the performance of their bots by addressing that problem, thereby reinforcing the developing affordance (i.e. innovative affordance). Such assistive affordances exhibit a different type of relationship between affordances from those proposed in the technology affordance literature, implying that certain technologies might have assistive affordances that contribute to the success of their main affordances.

6.3 Technological Context and Technology Use

6.3.1 Summary and explanation of the second empirical study findings

The second empirical chapter (Chapter 5) examined the role that technological complexity – conceptualised in this research as the multiplicity of platforms that are available to users to serve their goals – plays in explaining how users use Discord. Figure 6.2 summarises the findings of the second empirical study. The concept of affordance propensity was thus developed to examine technology use in situations where users have access to a wide range of platforms offering multiple affordances. Affordance propensity refers to the likelihood of leveraging a technology affordance to perform a task. This assumes that users evaluate the affordances of multiple platforms relative to each other, and this evaluation is based on three criteria that form the three dimensions of affordance propensity: relative effectiveness; relative normativity; and relative recognition. This evaluation process results in distinct patterns of multiple platforms use: substitutional or complementary use. The analysis of multiple platforms use in relation to Discord, which was discussed in Chapter 5, shows that the substitutional use of multiple technologies was largely explained by the relative effectiveness (arrow 8 in Figure 6.2) and normativity (arrow 9) of multiple platforms affordances, while the complementary use was mainly explained through the relative effectiveness (arrow 7) and recognition (arrow 6) of multiple platforms affordances. The relative importance of affordance propensity dimensions is contingent on three factors: the capabilities of the platform; relevant social groups; and task characteristics. The analysis also shows that the capabilities of the platform largely influence relative effectiveness (arrow 2) and recognition (arrow 1); relevant social groups mainly impact relative normativity (arrow 5); and task characteristics primarily influence both relative effectiveness (arrow 3) and normativity (arrow 4).

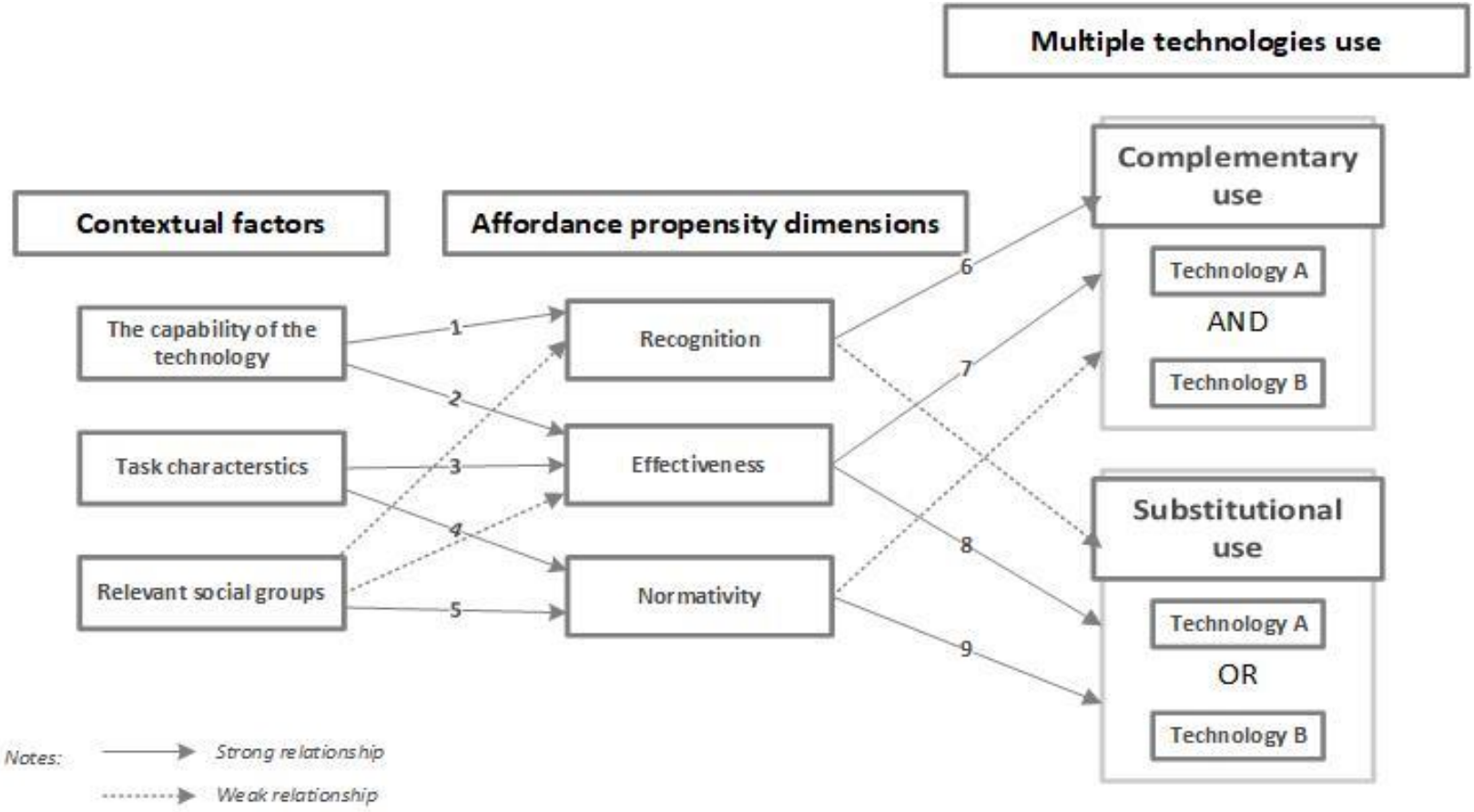


Figure 6.2. Summary of the second empirical study findings

Much of the existing research on technology use focuses on examining the use of a single technology (Carroll & Reich, 2017), and even when the use of multiple technologies is considered, the research uses terminologies such as portfolios (Carroll, 2008), repertoires (Watson-Manheim & Bélanger, 2007) or ensembles (Scheepers & Middleton, 2013) to describe the configurations of multiple technologies that users utilise, assuming that each technology within the configuration serves a particular purpose. Similarly, technology affordances research largely focuses on examining and identifying the affordances of a single technology (Lindberg et al., 2014). Such research, as shown in Figure 6.3 (box A), follows the traditional approach to examining a single technology affordance developed in extant affordances literature, which suggests that users interact with one technology feature and leverage its affordance to achieve their goal. However, in daily practice users rely on multiple technologies to carry out different tasks to achieve their goal. In the context of multiple technologies, as shown in Figure 6.3 (box B), users encounter multiple technologies and interact with the features of different technologies. To achieve their goal, they carry out multiple tasks and thus leverage the affordances of multiple technologies. This study proposes the affordance propensity as an explanatory concept that clarifies when users utilise multiple platforms in a substitutional or complementary way, considering the contextual factors that influence the affordance propensity dimension.

The introduction of the affordance propensity concept, which explains the likelihood of leveraging one technology affordance to perform a task, is related to an already existing concept in the literature: affordance potency (Anderson & Robey, 2017). The term “affordance potency” is used to explain how certain technology affordances are actualised, which is described as the strength of the relationship between users, technologies and the context. The strength of the relationship is conceptualised as the ease of actualising a particular affordance.

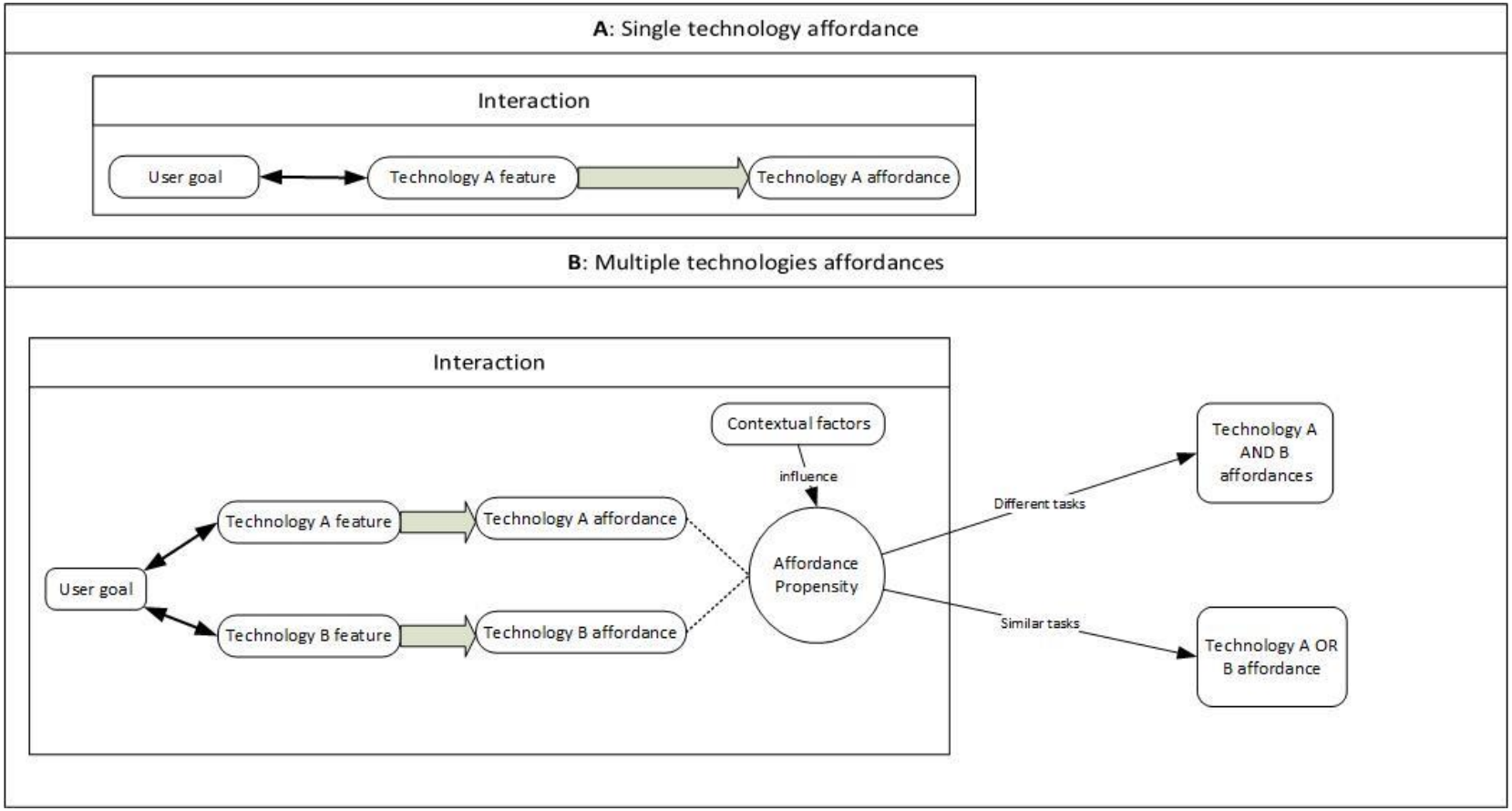


Figure 6.3. Approaches to examining single and multiple technology affordances

The affordance potency concept was built on the premise that technology affordances vary in the amount of effort required to carry out the action (Anderson & Robey, 2017). Therefore, the strength of the relationship between users, technology and context is conceptualised as the ease of actualising a particular affordance. Nonetheless, the affordance potency concept only covers the ease of actualising a particular technology affordance as a possible explanation for how people leverage certain affordances, but it is not sufficiently comprehensive to cover other dimensions. As discussed in Chapter 3 (section 3.5.2.3), the affordance potency was initially applied to the data to explain how participants leverage multiple platform affordances, but it proved insufficient to capture aspects other than the ease of leveraging the affordance that participants demonstrated. In some instances, participants reported that they leverage the affordance because it aligns with the norms of particular social groups (relative normativity propensity dimension) or because of the promptness of the affordance in achieving their goals (relative effectiveness propensity dimension). For instance, the relative effectiveness dimension encompasses not only the ease of leveraging the affordance in terms of the effort required to leverage the affordance, but also other aspects, including the promptness of achieving the user's goals and the quality of the platform affordance (e.g. video quality on Discord is better than on Instagram). Returning to the example provided in Chapter 5 (section 5.3.1), users leveraged Discord's solving issues affordance over Stack Overflow because Discord enabled them to answer their programming questions (i.e. their goal) faster than Stack Overflow due to the synchronous nature of interaction on Discord. It would not be possible to capture this dimension using the affordance potency concept. Due to these shortcomings, a new affordance propensity concept was developed to capture all the dimensions drawn from the data.

The likelihood of leveraging technology affordances also depends on how well the affordance fits with social groups' norms and expectations, i.e. its relative normativity. Existing research on technology use highlights the influence of other people who use a particular technology on individuals' perception and use of that technology. According to Fulk et al. (1990), the use of a particular technology is shaped by the attitudes and behaviours of other people who use it. They argue that social influence may take the form of discussions of other people's assessment and interpretation of technology features or learning through observing the behaviours of others. In the same way, Venkatesh et al. (2003) posit that social influence

impacts the use of technology through the identification of particular social groups and compliance with social norms to use a particular technology. The findings show that participants judge platform affordances based on their alignment with the established values and norms in specific social contexts. Relative normativity indicates that users leverage a particular platform affordance because it is expected that they will do so (i.e. they conform to the established norms and expectations in a specific context). While Venkatesh et al. (2003) find that social influence is a significant influencer in mandatory technology use settings and insignificant in voluntary settings, the relative normativity identified in this research was exhibited in both mandatory settings and voluntary settings. As highlighted in Chapter 5 (section 5.3.2), participants leveraged the platform affordance in a mandatory setting (e.g. using Zoom for work-related communication) and a voluntary setting (e.g. using Snapchat with friends because the user's friends use it exclusively for communication). Chapter 5 also identified relevant social groups (i.e. social networks of participants who share the use of a common technology) as influencing the relative normativity of platform affordances. The findings suggest that some participants leverage one platform affordance not because it is best suited to achieving their goals but because it aligns with specific social group norms, even though they might dislike that platform overall.

Another factor that influences the propensity to leverage a platform affordance is the capabilities of the platform. The literature on affordance actualisation identifies technology features as a factor that facilitates or constrains the actualisation of technology affordances (Strong et al., 2014; Anderson & Robey, 2017). Such research indicates that the difficulty of using a certain technology feature may impede the actualisation of its affordance. The findings of this thesis identify the capabilities of the platform as a factor influencing affordance propensity dimensions, hence affordance actualisation. The capabilities of the platform move beyond simply highlighting the difficulty or ease of using the platform features to focus more on the capacity of the platform to achieve users' goals. The identification of the capabilities of the platform in this research instead of platform features may be due to the fact that previous research focuses on the actualisation of one platform affordance, whereas in this research the focus was on examining the affordances of multiple platforms where they all might offer the same features. For instance, Discord and WhatsApp offer a communication affordance by having a video calling feature, but some people may find Discord video calls

more reliable with high-quality video calls and lower latency. While people can still video call on both Discord and WhatsApp, the capacity of the affordance is different. Thus, the capacity of the platform affordance to perform a task may be more relevant when examining multiple platform affordances instead of their features.

6.3.2 Contributions

The findings of the second empirical study bring several contributions to technology affordances literature and, more broadly, to research on technology use. First, the main contribution of this study is to research on technology affordances, which include the development of the affordance propensity concept, providing an explanation of how users make choices between multiple technology affordances. The existing body of literature on technology affordance tends to examine the use of a single technology (Lindberg et al., 2014), ignoring the fact that users are embedded in increasingly technologically complex contexts characterised by multiple and interrelated technological options. Given this focus on examining a single technology use, it is not surprising that we lack an explanation of how users leverage multiple technologies to achieve their goals. The affordance propensity concept developed in this study represents a first step to developing a theoretically informed explanation of multiple technologies use behaviour. The affordance propensity was developed by drawing on research into the legitimacy of organisational actions (Suchman, 1995) to explain how users evaluate and judge their choices, and the affordance actualisation literature (Anderson & Robey, 2017; Strong et al., 2014) to define the factors influencing users' evaluations. The findings of this thesis show that when users encounter different platforms offering multiple affordances, they evaluate multiple platform affordances based on the affordance propensity dimensions. These dimensions are informed by Suchman's organisational legitimacy framework (1995) and applied to platform users who assess the platform affordances based on their relative effectiveness, normativity and recognition. The adaptation of Suchman's criteria in this study helped explain the basis on which platform users evaluate the affordances provided by multiple platforms.

Second, the affordance propensity dimensions developed in this study contribute more broadly to several ongoing debates within the affordance literature. In particular, the relative effectiveness dimensions reveals that affordances differ in their ease of actualisations,

making some affordances more likely to be leveraged than others to achieve users' goals. Gibson (1979) views affordances as binary in nature, meaning that they either exist or they do not. The relative effectiveness dimension of affordance propensity corroborates other research challenging the assumption of binary affordances (McGrenere & Ho, 2000; Bernhard et al., 2013), instead suggesting that affordances lie on a continuum with varying degrees of difficulty. The analysis of multiple platform affordances in Chapter 5 showed that some affordances are better than others at achieving users' goals. The findings also indicated that one platform's affordance might be superior because it is easier or faster to leverage, better facilitating users to achieve their goals. Therefore, the findings show that the affordances that emerge from the interaction with multiple platforms vary in their capability to support goal achievement.

Third, the development of the relative recognition dimension provides support for the cognitive view of affordances (Norman, 2002). The affordance literature is characterised by an ongoing debate between the perceptual (Gibson, 1979) and the cognitive nature of affordances (Norman, 2002). The emergence of the relative recognition dimension in this research shows that in leveraging various platforms affordances, users engage in cognitive process underpinned by their experiences and memories. The findings indicate that users leverage the platform affordance they are familiar with by invoking recalled information about it. Thus, the relative recognition of an affordance dimension identified here provides further support to Norman's (2002) assertion that affordances are cognitive and not perceptual.

Fourth, the development of the affordance propensity concept contributes more narrowly to research on technology affordance actualisation by highlighting the antecedents to the actualisation process. Previous research shows that the actualisation of affordances generates outcomes that provide feedback on adjusting the actions taken to exploit affordances, but it does not explain what makes a particular affordance actualised in the first place (Strong et al., 2014). The affordance propensity concept developed in this research provides an explanation of how one technology's affordance is likely to be leveraged based on its relative effectiveness, normativity and recognition. The findings show that users are likely to leverage platform affordances if they are best suited to achieving their goals (effective), if they align with the established values and norms of a specific context

(normativity), or if they are popular and familiar to the users (recognition). While the affordance potency concept (Anderson & Robey, 2017) contributes to our understanding of affordance actualisation by indicating that an affordance with greater potency (i.e. less effort required to actualise it) is likely to be actualised, one drawback is that affordance potency focuses on one dimension: the level of effort required to actualise the affordance. The affordance propensity concept introduced in this study addresses this limitation by identifying different dimensions from effort as the antecedent elements of the affordance actualisation process.

Fifth, the findings expand research on affordance actualisation by highlighting task characteristics as an additional potential factor influencing the propensity of leveraging one platform affordance. Existing research identifies users' abilities, technology features and the organisational context as factors that influence the actualisation of technology affordance (Strong et al., 2014; Anderson & Robey, 2017). The findings of this study show that task characteristics influence the effectiveness of one platform affordance and make it more likely to be leveraged. As discussed in Chapter 5 (section 5.4.3), the analysis found that when some participants encounter complex programming issues, they leverage GitHub's solving issues affordance over that of Discord because it is more effective at solving such complex issues. Interestingly, the findings of this study did not find user abilities to be a factor influencing the propensity to leverage affordances. One possible explanation for this finding is the different levels of analysis. In this study, the level of the analysis is individuals who use multiple platforms, while Strong et al. (2014) and Anderson and Robey's (2017) level of analysis is the technology (electronic health records) and its use within an organisational context where there are variations in users' abilities to use the technology. Therefore, unlike the focus on the use of one technology that involves different users within organisational settings with varying abilities to use the technology, in the context of this study, user abilities are irrelevant since the assumption is that users will only use the platform if they are able to leverage its affordances; if users are unable to leverage a platform affordance, they will not use it.

Finally, the findings contribute to research on technology use by explaining the patterns of multiple technologies use, an area that has traditionally received little attention. Existing research highlights that multiple technologies can be competing or complementary without explaining how users abandon one technology for another or complement their main

technologies (Shih & Venkatesh, 2004). This study develops a theoretical apparatus explaining how and when multiple technologies are used by utilising the affordance propensity concept. The findings show that complementary use occurs when multiple platforms offer similar affordances and users evaluate one platform affordance to be more effective or normative. Then, the users temporarily switch between multiple platforms for a period of time. For instance, they leverage one platform affordance to communicate with a particular group and another platform affordance to communicate with a different group of people. In contrast, complementary use occurs when multiple platforms offer different affordances and users evaluate one platform as more effective or popular. Then, the users combine the use of multiple platforms by simultaneously leveraging their affordances. For example, they may leverage one platform affordance to communicate with people through text or audio and simultaneously leverage another to share files. Thus, in the context of using multiple platforms, users evaluate multiple platforms' affordances and, based on that evaluation, decide whether they will leverage multiple platforms' affordances in a substitutional or complementary way. Such evaluations are not only influenced by users' goals but also by other contextual factors, including the capabilities of the platform, relevant social groups and task characteristics.

6.4 Integrated Framework

The findings of the two empirical studies are brought together in Figure 6.4, illustrating the combined framework explaining technology use in socially and technologically complex contexts. The findings of the first empirical study (Chapter 4) indicate that users have goals and operate in social contexts characterised by multiple institutional logics. These multiple logics manifest in different configurations that represent the relationships between them as they may coexist, compete or reinforce each other. Users leverage certain patterns of logics as they use the technology. Since technologies consist of bundles of features that provide affordances, users with different goals come to the technology and leverage different patterns of affordances. The patterns of logic operate at the macro level and influence users' goals and actions at the micro level. As shown in Figure 6.4, a specific pattern of logics (patterns of logics 1 in Figure 6.4) influences (arrow 1) the patterns of leveraging a particular combination of technology affordances (technology 1), in turn leading to the use of that

technology (arrow 2). In the case of using a different technology (technology 2), a different journey of technology use occurs in which a different patterns of logics (patterns of logics 2) influences (arrow 3) the patterns of leveraging different combination of affordances of the technology (i.e. technology 2), leading to the use of that technology (arrow 4). It is worth noting that the multiple institutional logics in the two patterns of logics (1 and 2) outlined in Figure 6.4 are the same (IL(a), IL(b), IL(c)) but the relationships between them are different. For example, the relationship between the same types of logics might be supportive in the pattern of logics 1 and separated in the pattern of logics 2, thus users leverage certain patterns of affordances of technology 1 and 2.

The findings of the second empirical study (Chapter 5) developed the affordance propensity concept to explain how users choose which platform affordances to leverage. The findings of this study show that users encounter a range of platforms to choose from and thus have a wide choice of affordances to leverage to achieve their goals. Users evaluate the different affordances of these multiple platforms based on the affordance propensity dimensions (relative effectiveness, relative normativity and relative recognition). In the case of multiple technologies (i.e. technology 1 and technology 2 in Figure 6.4), each technology provides multiple affordances and users evaluate their affordances using the affordance propensity concept (the dotted hexagon in the figure). Users' evaluations of multiple technologies affordances (arrow 5) result in the use of multiple technologies substitutionally (i.e. leveraging technology 1 or technology 2 affordances at different times) or complementarily (i.e. leveraging technology 1 and 2 affordances simultaneously). These evaluations of multiple technologies' affordances are influenced by contextual factors (the dashed box at the bottom of the figure) arising from the macro-level social context (relevant social groups) and the micro-level technological context (the capabilities of the technology and task characteristics). Therefore, the affordance propensity concept addresses the technologically complex context (characterised by multiple technologies) by linking the relationship between the affordances provided by multiple technologies.

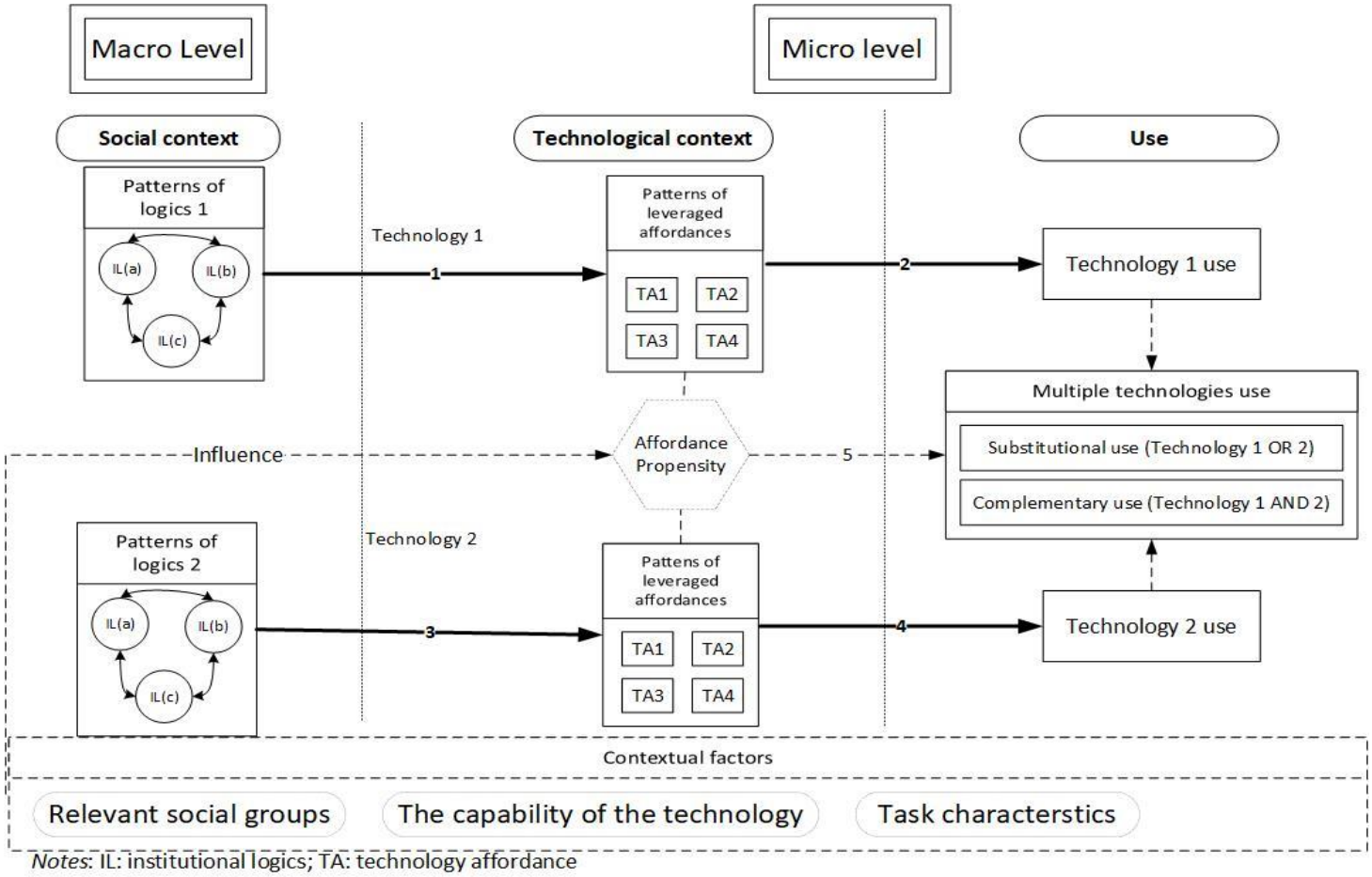


Figure 6.4. The integrated framework based on the first and second empirical study findings

This integrated framework offers an explanation for the use of digital technologies characterised by openness and generativity in socially and technologically complex contexts. Digital technologies are characterised by openness, indicating that a wide variety of social actors who operate in multiple social contexts are involved in the use of the technology. This wide involvement in the use of digital technologies heightens the complexity of the social context. By considering technology users as social actors embedded in multiple social contexts characterised by different institutional logics that shape their behaviour, the framework explains how the configurations of multiple institutional logics shape social actors' perceptions of technology affordances and their patterns of technology use. Although existing research on institutional logics and technology affordances finds that the type of logics guide actors to leverage certain affordances (Hultin & Mähring, 2014; Faik et al., 2020; Ingram et al., 2014; Seidel & Berente, 2013), the framework indicates that in the context of Discord at least, it is the type of relationship between logics (i.e. their configurations) that guides actors in leveraging certain configurations of technology affordances.

Digital technologies are also characterised by generativity, suggesting that over time the features of different technologies are increasingly overlapping, leading to a wide range of technological options for users. While existing literature on technology use does not explain how users utilise multiple technologies together, this framework explains how and when users apply multiple technologies together. The framework shows that users utilise multiple technologies together, either in a substitutional way by leveraging each technology affordance at a time, or in a complementary way by combining the affordances of multiple technologies at the same time. By using the affordance propensity dimensions, the framework also explains when users draw on multiple technologies by revealing the criteria that users apply to choose which technology to use. It shows that users utilise multiple technologies substitutionally when the affordance of one technology is more effective or normative than that of other technologies, and they use multiple technologies complementarily when the affordance of one technology is more effective or recognised than that of others.

The framework also explains when users engage in generative uses of the technology. It provides a conceptual framework that considers the role of the context (both social and technological) in facilitating the generative use of technologies. In terms of the social context,

the framework suggests that users engage in generative use (e.g., leverage Discord's innovating affordances to develop novel bots) when they operate in multiple (complex) social contexts. So, as users interact in multiple social contexts and draw from a configuration of logics, they start to identify problems or opportunities that stimulate the innovative use of the technology. In terms of technological context, the multiplicity of technologies enables users to integrate the affordances of multiple technologies in new ways to generate novel solutions. For instance, Chapter 5 (section 5.2.2) discusses how participants developed Discord bots by integrating the affordances of multiple technologies in a complementary way in order to solve existing problems or improve the functionality of Discord.

Overall, this integrated framework contributes to existing research on technology use by providing a toolkit that captures the complexity of contexts shaping technology use. Extant research on technology use shows the importance of considering the context in which technology use occurs (Russel & Williams, 2002; Orlikowski & Barley, 2001; DeSanctis & Poole, 1994). The framework bridges the macro- and micro-level contexts by demonstrating the influence of the macro level – conceptualised as the configurations of institutional logics characterising the social context in which technology use happens – on the micro-level technology use – conceptualised as technology affordances associated with multiple technologies that reflect their patterns of use. Therefore, the framework provides a richer understanding of the patterns of technology use (both single and multiple uses) by taking into consideration two dimensions of the complexity of the context in which technology use occurs: the social and technological contexts.

The integrated framework also extends affordance-based studies of technology use that mainly focus on users' goals as the driver for leveraging affordances by including other contextual factors that are found to be important in the process of leveraging technology affordances. The framework shows that three factors operating in different contexts influence the affordance propensity to leverage technology affordances: the social context (relevant social groups); the technological context (the capabilities of the technology); and the task context (task characteristics). Thus, these factors must be taken into consideration alongside users' goals when examining technology use.

6.5 Conclusion

This chapter discusses the findings of the two empirical studies conducted in this thesis. These findings are first summarised and then explained by leveraging relevant existing literature, followed by an in-depth discussion of the key contributions that each of the two empirical studies bring to existing research on technology use: technology affordances and innovative use of technology. The chapter concludes with the development of a combined theoretical framework that bridges the macro and micro levels of analysis and integrates the findings from analysing the social and technological complexity in relation to technology use. The framework is proposed as a toolkit allowing for a more granular analysis of the patterns of digital technology use that account for the complexity of social and technological contexts in which such use occurs.

7 Chapter 7: Conclusion

7.1 Research Objective

Technology use is a well-researched topic within IS literature. Extensive interpretive research has been conducted to explain how people engage with technology and it has been emphasised that the context in which technology is used matters when examining technology use (Orlikowski & Barley, 2001; Russell & Williams, 2002; Leonardi & Barley, 2008). This thesis began by arguing that the context of technology use has changed and is becoming more complex due to the proliferation of digital technologies. Such digital technologies are incorporated into our everyday lives, blurring the boundaries of personal and professional use. Studies on technology use that look at the social context tend to examine the use of technology in isolation from other contexts, as well as examining the use of singular technologies without considering the wider technological landscape. The core premise of the argument put forward is that these digital technologies have unique characteristics (openness and generativity) that intensify the complexity of the context, suggesting the need for new theories or to adapt existing theories to account for these characteristics.

The openness of digital technologies has led to the involvement of diverse users operating in multiple social contexts and drawing on multiple norms, expectations and practices. As a result, the social context associated with the technology becomes more complex. The generativity of digital technologies has led to the convergence of various technology features and functionalities due to their dynamic and constantly evolving nature. As such, generativity intensifies the complexity of the technological context as multiple technologies provide overlapping features and functionalities serving users' goals. This thesis set out to understand digital technology use in complex contexts. As discussed in the introduction chapter, this contextual complexity involves two dimensions: social, referring to the multiplicity and diversity of user involved in the use of digital technologies; and technological, referring to the multiplicity of technologies available to these users. Consequently, this thesis articulated two research questions to examine the role of social and technological context complexity in shaping technology use:

1. How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?
2. How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve users' goals?

Two empirical studies were conducted to answer the research questions. The first empirical study (Chapter 4) focused on the first research question, examining technology use in socially complex contexts. To answer this research question, the first empirical study employed a theoretical framework combining the technology affordance lens to examine technology use and the institutional logic perspective to examine the social complexity arising from the multiplicity of institutional logics that users draw from and shape the use of technology. This study examined the relationship between Discord affordances leveraged by participants and the institutional logics they embraced. As noted in Chapter 4, this study departed from the traditional approach followed in the existing literature, which examines technology affordances and institutional logics individually, instead considering the relationship between multiple institutional logics (i.e. their configurations) and technology affordances. This departure has demonstrated the value of examining the configurations of logic to explain the patterns of technology use.

The second empirical study (Chapter 5) focused on the second research question to examine technology use in technologically complex contexts. To answer this research question, the second study leveraged the technology affordances lens to examine the affordances offered by multiple technologies, thereby addressing the technological complexity. This study responds to the lack of research on the multiple technologies used, which is an area that has received little attention in the literature (Carroll & Reich, 2017). As discussed in Chapter 5, this study focused on how participants select and use multiple platforms together by identifying the criteria they apply to evaluate the affordances of multiple platforms. Table 7.1 provides a summary of the key findings of the two empirical studies.

Table 7.1. Summary of research questions and key findings

Research Question	Theoretical Framework	Key Findings
How does social complexity arising from the multiplicity of social actors shape users' patterns of technology use?	Technology affordances and institutional logics	1. Participants often draw from multiple institutional logics when they use Discord. 2. Participants drawing from multiple institutional logics leverage the innovative and assistive innovating Discord affordances. 3. Multiple institutional logics are exhibited in two configurations – separated and supportive – that shape technology use patterns. 4. Participants exhibiting a separated logic configuration have a higher propensity to leverage innovative affordances due to exposure to diverse knowledge sources.
How does technological complexity arising from the multiplicity of technologies shape the use of different technologies to achieve their goals?	Technology affordances	1. Participants use multiple platforms substitutionally to leverage similar affordances of multiple platforms at different times and complementarily to simultaneously leverage different affordances of multiple platforms. 2. Affordance propensity dimensions (relative effectiveness, normativity and recognition) explain the patterns of multiple platforms use. 3. Substitutional use of multiple platforms is explained by the relative effectiveness and normativity dimensions, whereas complementary use is explained by relative effectiveness and recognition dimensions. 4. Three contextual factors influence affordance propensity dimensions: the capabilities of the platform, relevant social groups and task characteristics. 5. The capabilities of the platform influence relative effectiveness and recognition, the relevant social groups influence relative normativity, and task characteristics influence relative effectiveness and normativity.

This thesis makes several contributions to research and practice, with the contributions of the two empirical studies discussed in Chapter 6 (sections 6.2.2 and 6.3.2). There are three important contributions that can be drawn from the findings of the empirical studies. First, the thesis conceptually explains the relationship between social complexity and technology use by providing an alternative explanation to the one in the existing literature. The main approach to linking the social context with technology use in existing studies entails examining the relationship between individual institutional logic and technology affordance (e.g. Hultin & Mähring, 2014; Oborn et al., 2021; Oostervink et al., 2016; Faik et al., 2020; King et al., 2022). As discussed in Chapter 4 (section 4.4.1), this approach did not reveal distinguishable patterns of technology use; instead, the analysis of the configurations of multiple institutional logics and technology affordances explained the different patterns of technology use. This analysis of configurations of logics and affordances offers an alternative way to explain technology use.

Second, the thesis extended the technology affordance lens by developing a new concept that explains the mechanisms people use to select and apply multiple technologies. The concept of "affordance propensity" was introduced in Chapter 5 as an explanatory construct that clarifies how people judge and use multiple technologies. This concept builds on and extends the affordance potency concept (Anderson & Robey, 2017), which is based on the premise that actualising technology affordance depends on the effort required to actualise it. The affordance propensity concept identifies dimensions other than the effort required to actualise the affordance, including relative effectiveness, normativity and recognition. These dimensions represent the antecedents of the affordance actualisation that people rely on to evaluate and use particular technologies.

Finally, the findings of the two empirical studies are combined to develop an integrated framework which explains technology use in complex contexts. As discussed in Chapter 6 (section 6.4), this framework provides a richer understanding of technology use (both single and multiple) in socially and technologically complex contexts by bridging the macro-level influence of the context on the micro-level technology use. The integrated framework explains how and when people use multiple technologies by drawing on the affordance propensity concept in the technologically complex context characterised by a multiplicity of technologies. The framework also explains when people engage in the generative use of

technology as they operate in multiple social contexts and draw upon diverse configurations of institutional logics. This framework also shows that users' goals are not the only factor for leveraging technology affordances and it identifies relevant social groups, the capabilities of the technology and task characteristics as other contextual factors that influence the likelihood of leveraging technology affordances.

The thesis also makes several contributions to practice. First, the thesis underscores the critical role of diverse perspectives and insights as a driver for innovative behaviour. This thesis provides actionable insights for software developers on Discord by directing their attention to the need to engage with a wide range of user groups to support their efforts to develop innovative bots. The findings of this thesis show that this exposure to a broad spectrum of users enables bot developers to identify unmet needs that inspire innovative bot development. For instance, partnering with other users from different communities facilitates the development of innovative bots, leading to the creation of more sophisticated and useful bots, as diverse skills and expertise are brought together. Additionally, actively seeking and incorporating feedback from various communities ensures that the bot functionalities are continuously improved and adapted to meet emerging needs. Such feedback allows bot developers to fine-tune their bots, address any issues promptly, and implement new features that users find valuable.

Second, the second empirical study shows that Discord users often use Discord with other platforms such as Twitch, YouTube, GitHub, WhatsApp and Slack to achieve their goals effectively. This insight provides a useful reminder to Discord developers in particular, but also to developers of other kinds of communication platforms that by facilitating seamless integrations with other common platforms, they have the opportunity to enhance the platform's interaction capabilities, increasing the platform appeal to their users. Efforts to facilitate such integration could include, for instance, the prioritisation of real-time synchronisation between Discord channels and external platforms to enable seamless exchange of data, and providing comprehensive documentations, tutorials and support tailored to end users for integrating Discord with other various platforms. Such effort would strengthen the platform's position as a versatile hub for communication, collaboration and community building, meeting the diverse needs of users across different contexts, thereby increasing its attractiveness to users.

Third, technology developers often face difficulties in designing a technology that meets diverse users' needs (Bernardi et al., 2019). The findings of the two empirical studies show how participants utilised Discord's API to develop applications that add new features and functionalities that suit their needs. These findings highlight the importance of making resources such as open API and software development kits (SDKs) accessible to end-users to enable them to personalise the platform to fit their needs. For instance, many participants developed Discord "moderation bots" that provide more advanced moderation features that are not natively built on Discord, such as the "mod log" feature that contains information about the name of people who violate the community rules, the type of action taken against them (e.g. ban, warn, mute), the duration of the action, the time of the offence and the moderator responsible for the action (see Figure 3.2 in the Methodology Chapter, section 3.4.2.4 for an example of the mod log feature), which is more advanced than the native moderation tools provided by Discord. Discord provided access to its API from the start by releasing its unofficial API in 2015.[10] Discord embraces and highlights the bots that users create in its blog posts, which has ultimately contributed to enhancing the platform's functionality and facilitating its growth. As such, some of the new features that Discord introduces are inspired by these bots developed by users. One example is the "auto mod" feature that Discord added in 2022,[11] which has been offered by bots since the release of the API. It is therefore recommended that platform developers support such innovative applications by giving access to resources such as APIs as they are not only beneficial to users but also expand the possibilities of the platform in a way that developers themselves might not have envisioned, which will ultimately accelerate the adoption and diffusion of the platform.

Finally, the affordance propensity dimensions that users employ to evaluate multiple platforms might assist platform developers in designing their platforms in accordance with these dimensions. For instance, it is presumed that technology developers design their technologies to serve the users' needs (McLaughlin et al., 1999). The findings of the second empirical study suggest that designing a platform to best serve users' needs is not the only

[10] https://discord.com/blog/the-robot-revolution-has-unofficially-begun-unofficial-api (accessed 26 January 2024)
[11] https://discord.com/blog/update-tools-building-sustaining-communities-discord (accessed 26 January, 2024)

factor to consider. Instead, the findings imply that platform developers should design their platforms to align with the established norms and values of their target users and also develop their platforms with careful consideration of the features and functionalities of the existing popular platforms or platforms that the target users are familiar with to boost the diffusion of their platforms.

7.2 Research Limitations

Although this thesis has demonstrated how the patterns of technology use are shaped by the complexity of the social and technological contexts, it has a number of limitations. First, similar to other interpretive single case studies, the generalisability of the findings is limited to specific digital technologies and contexts. Although other digital technologies share characteristics with Discord, such as social media, artificial intelligence and digital platforms that are open and generative, the findings of this research are specific to Discord. Nonetheless, Orlikowski and Baroudi (1991, p. 5) maintain that the generalisation in interpretive case study research "is not sought; rather, the intent is to understand the deeper structure of a phenomenon, which it is believed can then be used to inform other settings". While the findings of the thesis are not generalisable per se to any other digital technologies, since the context matters in examining technology use, the analytical approaches, such as the configurational analysis of logics and affordances, and concepts developed, such as affordance propensity, retain broader applicability. As suggested by Walsham (1995) (discussed in Chapter 3, section 3.2), the generalisation of interpretive research can take the form of contributions to new richer insights and the development of new theoretical concepts that can be applied to study other technologies in different contexts. For instance, the approach to examining the configurations of logics and Discord affordances discussed in Chapter 4 is applicable to other digital technologies in different contexts. This approach, in the context of this research, yields a better explanation for the patterns of technology use than the approaches in existing research. Similarly, the concept of affordance propensity developed in Chapter 5 can be applied to other technologies to examine the antecedents and the contextual factors that influence the actualisation of different technology affordances.

The second limitation of this research is the limited diversity of participants employed in both empirical studies compared to the general users of Discord. The first study entailed

interviewing only 20 participants, who did not cover all categories of Discord users. While the intention was to obtain diverse participants from different categories and interview at least five participants from each category to ensure good representation, access to participants impeded the achievement of this (as discussed in Chapter 3, section 3.4.2). Thus, exploring other categories of users who were impossible to access might reveal additional insights into the different patterns of use. Similarly, the second empirical study focused on only one group of Discord users – software developers – because they were the category of users most likely to have the required knowledge and experience to answer the research question. While it provided the research access to rich and in-depth data, the focus on developers excluded the perspectives of other groups of users from the study. These perspectives could be important for understanding more fully the use of multiple platforms with Discord, for instance, by identifying other criteria followed by other groups of users in evaluating multiple platform affordances beyond those identified for software developers.

The third limitation, which is a consequence of the limited diversity of participants, is that the multiple institutional logics in Chapter 4 do not include all the configurations in the context of Discord. Other configurations, such as contested, aligned, estranged and dominant (Besharov & Smith, 2014), might exist among other categories of users than those included in the study. In the same way, the affordance propensity dimensions (relative effectiveness, normativity and recognition) identified in the second empirical study, along with the contextual factors that influence their relativity (relevant social groups, the capabilities of the platform and task characteristics), are not exhaustive. Other dimensions might assume relevance in other contexts and be influenced by other contextual factors. For example, this study did not find users' abilities to be a contributing factor influencing the propensity dimensions because it focused on voluntary and individual use of multiple platforms. Users' abilities might prove to be an essential factor when analysing multiple technologies use in organisational settings where collaboration between different teams is required. Similarly, other affordance propensity dimensions and contextual factors might emerge as relevant when examining the use of multiple technologies in mandatory settings.

7.3 Recommendations for Future Research

The findings of this thesis open promising avenues for future research. First, it would be worth future research considering the application of the integrated framework developed in Chapter 6 (section 6.4) to examine the use of other digital technologies such as other social media platforms (Facebook, Reddit), AI, and blockchain. Applying the framework in different contexts would enhance its explanatory power by refining and integrating new concepts and components from other contexts. Applying the affordance propensity concept to other contexts might also reveal additional dimensions and factors influencing users' evaluations. Further research is needed to go beyond individual-level use and focus on organisational-level use to uncover other affordance propensity dimensions that are relevant in the organisational context. For example, relative integrability may seem relevant in an organisational context where the affordances of new technology might be more integrable with existing technologies' affordances leveraged by the organisation.

Second, the first empirical study was conducted with limited categories of Discord users due to access challenges. Further research might investigate Discord use with a larger sample encompassing a broader range of Discord users from a wide array of categories, which would provide a richer understanding of the differences in patterns of users across these categories. Including broader categories might help identify new institutional logics that participants draw from and reveal new configurations of logics. For instance, this study did not find a conflicting relationship between multiple logics, which might be attributed to the voluntary nature of use investigated. Future research could explore the possibility of identifying the contested configuration between multiple logics, particularly in organisational settings where users are pressured by various logics, and consider how the contested configuration influences affordance actualisation. The second empirical study in turn examined the multiple platforms used by Discord bot developers. Hence, it is recommended that future research include more diverse users and examine their patterns of multiple platforms use. Incorporating diverse users might reveal other types of multiple platforms use beyond substitutional or complementary. For example, sequential use of multiple platforms might be relevant to some users when using one platform leads to using another related one.

Third, the integrated framework, as shown in Figure 6.4, focuses on the macro-micro interactions when analysing technology use. Thus, the meso level is absent from the framework because the context of this research focuses on investigating individual-level use of technology. Future research might explore the organisation-level technology use and build on the integrated framework to incorporate the meso level to examine the interaction between the macro-meso-micro levels, offering deeper insights into technology use patterns at different levels of analysis. Such analysis might reveal factors operating at the meso level that influence the perception and actualisation of technology affordances. The integrated framework also only examined the macro-level effect of the configurations of logic on the micro-level technology affordances and did not examine micro-to-macro influence. Several studies have looked at the micro-to-macro influence where technology affordances can cause institutional change by shifting between the multiple institutional logics (Faik et al., 2020; Essen & Varlander, 2019). More research is required to assess the effect of technology affordances at the micro level on the configurations of institutional logics at the macro level. This examination would explain the recursive relationship between affordances and institutional logics and highlight the impacts of leveraging technology affordances on the relationship between multiple logics. For example, this may entail exploring how the technology affordances leveraged by users can transform existing configurations between multiple logics from separated to supportive or vice versa.

Fourth, technology use in this research was examined at one point in time, capturing a snapshot of the interaction between users and the technology. It is recommended that future research conduct longitudinal research that incorporates a temporal analysis looking at the evolution of platform use over time. It would be interesting to explore how, for example, the relationship between logic configurations and platform affordances changes, or how the logic configurations may transform over time. Similarly, it would be fruitful to conduct longitudinal research on the multiple platforms used to see how the nature of use may change over time, such as a change from complementary use of multiple platforms to substitutional use or vice versa.

Finally, one possible area of future research on online communities would be to explore Discord's online communities, particularly investigating how independent software developers utilise Discord to build communities around their products. There is research that

looks at online communities created and maintained by technology vendors, such as Salesforce (Yan et al., 2016), SAP (Huang et al., 2018) and Oracle (Mozaffar, 2016), to share knowledge between vendors, end-users and partners. The findings showed that independent developers create Discord servers around their Discord bots to provide support, gather feedback and inspire new features in their bots. Examining how independent developers leverage Discord's communities may highlight the challenges, needs, and opportunities they experience during the development process. Moreover, future research on online communities might explore the difference between vendor-led and developer-led online communities as it may reveal new insights into community governance and control, knowledge sharing practices, motivation to participate and contribute and impact on the development process.

7.4 Concluding Remarks

The proliferation of digital technologies in every aspect of our lives has motivated this thesis to research their uses. The core argument put forward was that the context in which technology is used has changed significantly, becoming more complex due to the unique characteristics of these digital technologies. This thesis presents a shift in how we study digital technology use by considering the complexity associated with the social and technological contexts. The two empirical studies carried out addressed this context complexity by leveraging the institutional logics and technology affordances theoretical lenses. The first study showed that people operating in complex social contexts characterised by a multiplicity of institutional logics have a high tendency to innovate in their use of Discord, particularly when the configuration of multiple logics is separated as they have access to diverse perspectives, opinions and ideas obtained from multiple institutional logics. The second study illustrated how people use multiple platforms together (either substitutionally or complementarily) to achieve their goals, as well as clarifying the criteria they apply to evaluate and use these platforms by developing the affordance propensity concept. Overall, the thesis provides a more granular understanding of digital technology use than previous research by delineating the complex relationship between technology use at the micro level and the broader context at the macro level.

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9 Appendices

Appendix 1

Participant information sheet for the first study

PARTICIPANT INFORMATION SHEET

Research Project Title: Technology Use and its Impact on Everyday Work Practices

Dear Participant,

You are being invited to take part in a research project. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask questions if anything is not clear or you would like more information. Take some time to decide whether or not to take part.

WHAT IS THE PURPOSE OF THE PROJECT?

The purpose of the project is to understand how the use of technology affect users' practices. The project examines the use of Discord App -which is a chatting platform used mainly but not only by gamers- and seeks to investigate how different types of users engage with the app as well as how people use Discord along with other technologies to achieve their goals. The project will also examine different categories of users and uses- while Discord has been introduced as a chatting platform designed for gamers. Recently it has been taken up by a variety of different users using it for different purposes, ranging from supporting teaching, internal communication in start-ups, artwork, social networking, etc. The project will explicitly focus on examining the use of discord only for people over 18 years old.

WHY HAVE I BEEN INVITED TO PARTICIPATE?

You have been invited to participate in this study because you might have the relevant knowledge that would be helpful to answer the research questions. The project will look at different users of Discord whether gamers or non-gamers to better understand the platform and how it helped them in pursing their daily activities.

The research will focus on people who are over 18 and active users of Discord to hear from them about their experience of using Discord, learn more about their daily activities and how do they utilise Discord and other platforms to achieve their goals.

DO I HAVE TO TAKE PART?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this Participant Information Sheet to keep and be asked to sign an Informed Consent Form. If you decided to take part you are still free to withdraw from the study at a later date, without giving a reason.

WHAT DOES TAKING PART INVOLVE?

You will be asked a number of questions regarding your daily routines as a gamer, a background of yourself, and what software/platforms you usually use when you play games and how do use them in general. The interview will be online at a time that is convenient for you and will last approximately 30-45 minutes. The interview will be audio-recorded and transcripts will be produced and you will get the opportunity to have a copy of the transcript if you want.

ARE THERE ANY POSSIBLE RISKS OR DISADVANTAGES IN TAKING PART?

There are no significant risks anticipated from participation in this research project.

WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART?

While there are not immediate benefits for people participating in the project, it is hoped by sharing your experience with us, you will be helping the researcher and the University to better understand how you use Discord and other platforms to support your daily practices and further our understanding of how these technologies can be used.

WHAT IF I WANT TO WITHDRAW FROM THE PROJECT?

Agreeing to participate in this project does not oblige you to remain in the study or to have any further obligations to the research project or team. If at any stage you no longer want to be part of the study, you can withdraw from the project by contacting the researcher. You should note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, reports) prior to your withdrawal and so you are advised to contact the researcher at the earliest opportunity should you wish to withdraw from the study.

You can withdraw from the project at anytime, up to the completion of the project. If you withdraw from the project all the information and data collected from you, to date, will be destroyed and your name removed from all the project files.

HOW WILL MY DATA BE LOOKED AFTER DURING THE PROJECT?

The researcher will have unrestricted access to raw data obtained from your interview. Supervisors Dr Raluca Bunduchi and Dr Stephen Harwood from Business School, may have access to the data in their supervisory and advisory roles.

All your data will be processed and stored in accordance with the General Data Protection Regulation (GDPR) along with the Data Protection Act 2018 (DPA). The project will be also be guided by and adhere to the University of Edinburgh's data protection guidance and regulations, see http://www.recordsmanagement.ed.ac.uk/InfoStaff/DPstaff/DataProtectionGuidance.htm

No personal data such as addresses, phone numbers, etc, will be collected, other identifiable data will be confidential within the research team and stored on the university secured network, in accordance with the General Data Protection Regulation, and the latest University of Edinburgh data security protocol.

WHAT WILL HAPPEN TO MY DATA AFTER THE END OF THE PROJECT?

After all publications have been published, all data will be deleted using the latest University of Edinburgh protocol for secure data deletion.

WHAT WILL HAPPEN WITH THE RESULTS OF THE RESEARCH PROJECT?

The results of this study will be published in PhD dissertation, academic articles, books, reports, presentation, and other research outputs. Quotes from your interview may be used in these outputs, and these will be anonymous, and any identifiable data will not be revealed.

WHO HAS APPROVED THIS PROJECT?

This research project has been approved through the ethical review process in the School of Business at the University of Edinburgh.

CONTACT FOR FURTHER INFORMATION

If you have any further questions about this project, please contact the researcher, Ghaith Almomani, g.a.almomani@sms.ed.ac.uk. Or Principal Research Supervisor, Dr Raluca Bunduchi, raluca.bunduchi@ed.ac.uk .

For general information about how the University of Edinburgh looks after research data go to: https://www.ed.ac.uk/records-management/privacy-notice-research

THANK YOU FOR TAKING TIME TO READ THIS PARTICIPANT INFORMATION SHEET.

DATE:

Consent form for participants in the first study

UNIVERSITY OF EDINBURGH
Business School

Project Title: Technology Use and its Impact on Everyday Work Practices

CONSENT FORM

Thank you for agreeing to take part in the research project. Ethical procedures for academic research require that participants explicitly to agree to being interviewed and how the collected information will be used. consent form is necessary to ensure that you understand the purposes of your involvement and that you agree with the conditions of your participations.

Could you please sign this form to certify that you approve the following;

1. You are 18 years old or over.
2. You have read and understood the information sheet for the research project, and you have given the opportunity to ask any further questions to your satisfaction.
3. Your participation is voluntary and you can withdraw from the project at any time, up to the point of completion, without having to give any reasons for why you no longer want to take part and without any consequences.
4. The interview will be online and will last approximately 30-45 minutes. The interview will be audio recorded and a transcript will be produced. Identifiable data will be anonymised, and the interview transcript will be sent back to you- if you asked- for verification prior to being used during the analysis.
5. A direct quotation of your words may be used in academic publication, articles, reports, and other research outputs but care will be taken to ensure that any identifiable information of the interviews will not be revealed.
6. Access to raw notes and interview transcript will be limited to the researcher and research advisors.
7. The researcher may re-contact you at future date if he wishes to follow up on this research.

Name of research participant	Date	Signature

Name of researcher recording consent	Date	Signature

Participant information sheet for the second study

PARTICIPANT INFORMATION SHEET

Research Project Title: Understanding Digital Technology Use in Complex Contexts

Dear Participant,

You are being invited to take part in a research project. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask questions if anything is not clear or you would like more information. Take some time to decide whether or not to take part.

WHAT IS THE PURPOSE OF THE PROJECT?

The purpose of the study is to understand how different types of users use Discord differently and how they use Discord with other platforms to achieve their goals. Discord which is a chatting platform has been introduced as a chatting platform introduced for gamers, but recently it has been taken up by a variety of different users using it for different purposes, ranging from teaching, internal communication in start-ups, artwork, social networking, software development, and other uses. Users often use different platforms that sometimes serve the same purpose (e.g., Discord and WhatsApp for messaging). This study will examine other platforms or apps (e.g., YouTube, Twitch, Reddit, Slack, GitHub, etc.) that users use alongside with Discord and how they utilise them together to complete a particular task.

WHY HAVE I BEEN INVITED TO PARTICIPATE?

You have been invited to participate in this study because we believe you might have the relevant knowledge and experience in using Discord with other platforms that would be helpful to answer the research questions.

The research will focus on people who are over 18 and active users of Discord to hear from them about their experience of using Discord, and learn more about how they utilise Discord and other platforms to pursue their activities.

DO I HAVE TO TAKE PART?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this Participant Information Sheet to keep and be asked to sign an Informed Consent Form. If you decided to take part you are still free to withdraw from the study at a later date, without giving a reason.

WHAT DOES TAKING PART INVOLVE?

You will be asked a number of questions regarding what do you use Discord for, what other platforms or apps you use with Discord, and what features of Discord and other platforms you found useful to achieve your goals. The interview will be online at a time that is convenient for you and should take around 45-60 minutes to complete. The interview will be audio-recorded and transcripts will be produced for the analysis.

ARE THERE ANY POSSIBLE RISKS OR DISADVANTAGES IN TAKING PART?

There are no significant risks anticipated from participation in this research project.

WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART?

Participants taking part in this study will be paid £15 in the form of voucher or PayPal payment as a compensation for their time and effort in participating in the study. By sharing your experience with us, you will be helping the researcher and the university to better understand the use of Discord alongside other platforms.

WHAT IF I WANT TO WITHDRAW FROM THE PROJECT?

Agreeing to participate in this project does not oblige you to remain in the study or to have any further obligations to the research project or team. If at any stage you no longer want to be part of the study, you can withdraw from the project by contacting the researcher. You should note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, reports) prior to your withdrawal and so you are advised to contact the researcher at the earliest opportunity should you wish to withdraw from the study. On specific request we will destroy all your identifiable answers, but we will need to use the data collected prior to your withdrawal, and to maintain our records of your consenting participation.

HOW WILL MY DATA BE LOOKED AFTER DURING THE PROJECT?

The researcher will have unrestricted access to raw data obtained from your interview. Supervisors Dr Raluca Bunduchi and Stephen Harwood from Business School, may have access to the data in their supervisory and advisory roles.

All your data will be processed and stored in accordance with the General Data Protection Regulation (GDPR) along with the Data Protection Act 2018 (DPA). The project will be also be guided by and adhere to the University of Edinburgh's data protection guidance and regulations, see
http://www.recordsmanagement.ed.ac.uk/InfoStaff/DPstaff/DataProtectionGuidance.htm

No personal data such as addresses, phone numbers, etc., will be collected, other identifiable data will be confidential within the research team and stored on the university secured network, in accordance with the General Data Protection Regulation, and the latest University of Edinburgh data security protocol.

WHAT WILL HAPPEN TO MY DATA AFTER THE END OF THE PROJECT?

After all publications have been published, all data will be deleted using the latest University of Edinburgh protocol for secure data deletion.

WHAT WILL HAPPEN WITH THE RESULTS OF THE RESEARCH PROJECT?

The results of this study will be published in PhD dissertation, academic articles, books, reports, presentation, and other research outputs. Quotes from your interview may be used in these outputs, and these will be anonymous, and any identifiable data will not be revealed.

WHO HAS APPROVED THIS PROJECT?

This research project has been approved through the ethical review process in the School of Business at the University of Edinburgh.

CONTACT FOR FURTHER INFORMATION

If you have any further questions about this project, please contact the researcher, Ghaith Almomani, g.a.almomani@sms.ed.ac.uk. Or Principal Research Supervisor, Dr Raluca Bunduchi, raluca.bunduchi@ed.ac.uk

For general information about how the University of Edinburgh looks after research data go to: https://www.ed.ac.uk/records-management/privacy-notice-research

THANK YOU FOR TAKING TIME TO READ THIS PARTICIPANT INFORMATION SHEET.

DATE: 3/04/2023

Consent form for the participants in the second study

Participant Consent Form

Study Title: Understanding Technology Use in Complex Contexts

Researcher's name and Contact details: Ghaith Almomani (G.A.Almomani@sms.ed.ac.uk)

Participants Name:

Date:

1	I confirm that I am 18 years old or over	☐
2	I confirm that I have read and understood the Participant Information Sheet for the above study.	☐
3	I have been given the opportunity to consider the information provided, ask questions and have had these questions answered to my satisfaction	☐
4	I understand that my participation is voluntary and I can withdraw from the project at any time, up to the point of completion, without having to give any reasons for why I no longer want to take part and without any consequences.	☐
5	I understand that the interview will be online and will last around 60 minutes and it will be audio-recorded and a transcript will be produced.	☐
6	I am aware that direct quotation of my words may be used in academic publication, articles, reports, and other research outputs, and assured that any identifiable information from the interviews will not be revealed.	☐
7	I understand that access to raw notes and interview transcript will be limited to the researcher and research advisors	☐
8	I am aware that I will be paid £15 as a compensation in the form of voucher or PayPal payment	☐

Appendix 2

Discord affordances and combination of institutional logics

The analysis of the relationship between Discord affordances and institutional logics involves exploring whether there is variation between the different combinations of institutional logics and the affordances leveraged. This step was conducted after the difference in leveraging the innovative and assistive innovating affordances were identified between the single and multiple logics. The table below shows the results of this analysis. Only five participants drew from a single logic – the community logic – four drew from community and professional logics and 11 drew from all the logics. As seen in the table, the results of this analysis did not show significant differences in leveraging the innovative and assistive innovating affordances between the community and professional logics combination (75% of respondents leveraged innovative affordances, while 57% leveraged assistive innovating affordances) and the community professional and entrepreneurial logics combination (73% of respondents leveraged innovative and assistive innovating affordances).

Logics / **Affordances**	**Community Logic (5 participants)**	**Community + Professional Logic (4 participants)**	**Community + Professional + Entrepreneurial Logic (11 participants)**
Core	**5 (100%)**	**4 (100%)**	**11 (100%)**
Interacting	5 (100%)	4 (100%)	10 (91%)
Organising	4 (80%)	4 (100%)	9 (82%)
Assisting Core	**5 (100%)**	**3 (75%)**	**9 (82%)**
Automating	4 (80%)	3 (75%)	9 (82%)
Visibility	5 (100%)	2 (50%)	5 (45%)
Innovative	**0 (0%)**	**3 (75%)**	**8 (73%)**
Developing	0 (0%)	3 (75%)	8 (73%)
Assistive innovating	**0 (0%)**	**2 (57%)**	**8 (73%)**
Fixing issues	0 (0%)	2 (50%)	8 (73%)
Providing customer support	0 (0%)	2 (50%)	5 (45%)